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ABSTRACT

Goal 5 of the Adult Literacy and Lifelong Learning initiative of the U.S. Department of Education states that by the year 2000, every adult will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship. Flowing from this goal are the following five objectives: (1) every major U.S. business will be involved in strengthening the connection between education and work; (2) all workers will have the opportunity to acquire the knowledge and skills needed to adapt to emerging new technologies and workplaces; (3) the number of high quality programs available to serve the needs of part-time and midcareer students will increase substantially; (4) the proportion of students, especially minorities, who enter and college will increase; and (5) the proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially. Four key concepts are embedded in these objectives: lifelong learning, adult literacy, knowledge and skills for the global economy, and knowledge and skills for responsible citizenship. (This report includes a 127-item bibliography and the following commissioned papers: "Directions for Research in Adult Literacy" by Michael Pressley and John T. Guthrie; "Strengthening Connections between Learning and Work" by David Stern; "Outline of a Research Agenda for National Educational Goal 5, Objectives 1 and 2" by Thomas Bailey; and "Minority Success in a Global Economy" by Michael T. Nettles and Esther M. Rodriguez.) (KC)

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ED 362 740

Reaching The Goals

GOAL 5

Adult Literacy and Lifelong Learning

Technical Report

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Office of Educational Research and Improvement
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Prepared by the Goal 5 Work Group
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October 1993

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TECHNICAL REPORT

GOAL FIVE

Adult Literacy and Lifelong Learning

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OBJECTIVE ONE:

Every major American business will be involved in strengthening the connection between education and work. 7

OBJECTIVE TWO:

All workers will have the opportunity to acquire the knowledge and skills, from basic to highly technical, needed to adapt to emerging new technologies, work methods, and markets through public and private educational, vocational, technical, workplace or other programs. 10

OBJECTIVE THREE:

The number of quality programs, including those at libraries, that are designed to serve more effectively the needs of the growing number of part-time and mid-career students will increase substantially. 14

OBJECTIVE FOUR:

The proportion of those qualified students (especially minorities) who enter college, who complete at least two years, and who complete their degree programs will increase substantially. 17

OBJECTIVE FIVE:

The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially. 20

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- Directions for Research in Adult Literacy
- Strengthening Connections between Learning and Work
- Outline of a Research Agenda for National Educational Goal 5, Objectives 1 and 2
- Minority Success in a Global Economy

Foreword

This technical report formed the basis for *Reaching the Goals, GOAL 5, Adult Literacy and Lifelong Learning* (ED/OERI 92-44), which was published in July 1993. It was prepared by the OERI Goal Five Work Group: Cochairs Barbara Lieb and Nevzer Stacey, Salvatore Corrallo, Gayle Fisher, David Loope, and Liz Torbert. Selected papers commissioned for this project are appended.

GOAL 5: ADULT LITERACY AND LIFELONG LEARNING

By the year 2000, every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.

Introduction

Goal 5 recognizes that efforts to raise standards for education must expand beyond compulsory schooling if Americans are to participate successfully as citizens and workers in an increasingly complex society. It emphasizes the need for learning throughout one's lifetime, in formal, as well as informal educational settings.

It has been argued that if the nation's education resources were better spent on learners in compulsory schooling contexts we would need a minimal investment in education for adults. However, even if it were possible for the educational system to attain world class standards for most students, thereby decreasing the need for improving basic and higher order skills in adulthood, the nation would still need to focus on post compulsory schooling. Lifelong education is necessary to help people cope with the continuous changes in technology, society and the work place.

Finally, achieving the other five national education goals is in part dependent upon up-grading the knowledge and skills of many adults (especially parents), so that they are highly literate, value learning, and function as responsible citizens, especially in community processes relating to education. For example, the National Center for Education Statistics (*Digest of Education Statistics*, 1991), reports that parents who have not completed high school are less likely than other parents to report having regular talks with their children about school experiences, high school plans, or plans after high school (p.6).

As conceived at the President's education summit with the governors in 1989, Goal 5 reflects a broad array of concerns about post compulsory education. These center on the skills
needed by adults as learners, workers, and citizens ranging in complexity from basic literacy through higher order thinking; they center on the various contexts for adult learning, including the workplace, post secondary institutions and community settings such as libraries. In fact, the range and diversity of concerns implied by Goal 5 are so broad that a thorough analysis of all of the relevant issues would expand well beyond the scope of this paper. We have, therefore, organized major issues and related research findings around the following five objectives listed for Goal 5 by participants at the education summit:

1. Every major American business will be involved in strengthening the connection between education and work.

2. All workers will have the opportunity to acquire the knowledge and skills, from basic to highly technical, needed to adapt to emerging new technologies, work

methods, and markets through public and private educational, vocational, technical, workplace, or other programs.

3. The number of quality programs, including those at libraries, that are designed to serve more effectively the needs of the growing number of part-time and mid-career students will increase substantially.

4. The proportion of those qualified students (especially minorities) who enter college, who complete at least two years, and who complete their degree programs will increase substantially.

5. The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially.

Four key concepts stated in the overarching goal are considered first since these connect and focus issues under the five objectives: lifelong learning; adult literacy; knowledge and skills for the global economy; and knowledge and skills for responsible citizenship.

Lifelong Learning: The term "lifelong learning" and the notion of the "learning society" are variously defined, but most commonly have referred over the past fifteen years to "the process by which individuals continue to develop their knowledge, skills, and attitudes over their lifetimes." (Lifelong Learning Project, Department of Health, Education and Welfare, 1978). Lifelong learning has been used to describe adult learning for purposes of vocational and professional advancement, enjoyment and leisure, remediation and basic skills, and for knowledge and skills needed to function as a member of a family or community. Apps (1987) discusses a framework for looking at providers of adult education in four categories: fully or partially tax-supported agencies and institutions, such as public schools, colleges and universities, the armed forces, and libraries and museums; nonprofit, self supporting agencies and institutions, such as religious institutions, community agencies, and professional and worker education programs; for-profit providers, such as correspondence and proprietary schools, consultants and workshop organizers, computer software and book publishers, and nonorganized learning opportunities, such as television, work, and family and travel settings.

It is clear that the amount of formal education completed by American adults has continued to increase. The National Center for Education Statistics (*Digest of Education Statistics*, 1991) reports that in 1989, 77 percent of the population 25 years old and over had completed high school, an 8 percent increase over 1980. Also in 1989, 21 percent had completed four years of college, a 4 percent increase since 1980. NCES also predicts that from 1990 to 1997, there will be a rise of 16 percent in higher education enrollments of persons over 25, and an increase of only 5 percent in the number under 25. These and data to be presented under objectives 3 and 4 indicating that people will be pursuing formal postcompulsory education at older ages, have implications for instruction and programming in postsecondary institutions.

But adults are learning at all ages in settings varying widely in degree of formality and organization. In a nationwide survey of 2000 representative Americans 25 years of age and older, the College Board (Aslanian and Brickell, 1980) studied the causes and timing of adult learning. They concluded that half the adult population was engaged in some

kind of learning in a variety of settings, with approximately half of them attending four-year institutions; the other half engaged in a variety of formal and informal learning with many learning on their own through books, television and contacts with other people. Those adults who did engage in learning were younger, better-educated, wealthier, employed, and disproportionately white, in comparison with those who did not engage in learning. But regardless of demographic characteristics, adults were learning because of changing life circumstances or transition to a new status, most often related to career or family. (Aslanian and Brickell, 1980)

There is evidence that technology is helping adult learners become increasingly in control of when, where, and how they achieve new skills and knowledge. The use of computers and telecommunication provide new access to learning for remote adult populations, for special populations such as the disabled, for workers on-site, and at home. Lewis (1989) points out that adult learners will "develop sophisticated skills as educational consumers who will be able to identify their own learning styles and needs and to determine selectively what to use from . . . resources distributed by an ever-increasing number of educational institutions and private suppliers." (p. 621) Merriam and Caffarella (1991), in reviewing research on participation of adult learners in education point out that models for explaining or predicting participation have yet to be tested. There is much worthwhile research to be done on the objectives, learning "paths," and approaches to organized and nonorganized instruction taken by adults in the course of lifelong learning. In addition, we need to learn more about increasing access and incentives for those adults who could benefit from learning, but are not now participating.

Adult Literacy: What does it mean to say that "all adults will be literate by the year 2000?" Gaining consensus on the particular skills individuals need to function adequately in a pluralistic society and then measuring those skills have proven to be difficult tasks. Literacy skills in 1800 were defined largely as abilities to read and write. As we move toward the year 2000, we recognize that in our technologically advancing society, information needed for work, citizenship and learning is processed not only through the written word, but increasingly through interpersonal communication, the mass media, and other electronic means; citizens are expected to use such information in new and more complex ways.

Literacy is now commonly defined as reading, writing, speaking, computing and problem solving (National Literacy Act of 1991). However, many writers have urged that the definition be expanded to reflect the more complex abilities needed to function in our society; examples include visual literacy (e.g., understanding information portrayed through printed graphics and the TV camera); computer literacy; media literacy (the ability to critically evaluate what one sees and hears, primarily through television); and oral literacy (including critical listening and decoding of nonverbal messages).

Definitional problems are compounded by the lack of agreement about the minimal level of literacy skills needed for individuals to participate in society, and on the distribution or mix of literacy skills needed for the population as a whole (Frase, 1988). Despite these disagreements, there has been progress in measuring those literacy skills of Americans defined by the National Literacy Act. For example, in 1985 the National Assessment of Educational Progress (NAEP) assessed literacy skills of America's young adults (ages 21-25) by simulating tasks that people encounter frequently at work, at home and in the community. After measuring abilities on three literacy scales (prose, document and

quantitative), NAEP concluded that "illiteracy" was not a major problem for this population, since only a small number were unable to do simple reading, writing and computation tasks. However, "literacy" is a problem since large numbers of young adults were unable to accomplish even minimally complex tasks; the more complex the task, the higher the numbers of those who could not perform them. Low literacy was found to be a severe problem among minority groups. While scale scores increased with levels of educational attainment, black youth scored considerably lower than white youth with the same amount of education, and Hispanic youth generally scored between blacks and whites with the same educational level (Frase, 1988).

Pressley (1992) describes several categories of adults who could benefit from high quality literacy instruction, including: those who never learned to read, some of whom suffer from dyslexia; those whose poor reading skills keep them unemployed or underemployed; high school dropouts; prisoners, half of whom are illiterate; and others. Pressley also describes the many institutions and groups who provide literacy instruction to adults, including schools, universities, educational groups, and libraries. Citing research on the effectiveness of these programs, Pressley states, when researchers have looked they have found discernible improvements in the literacy of adult literacy program participants (Pressley, 1992). However, he also describes research indicating that most participants in literacy programs drop out before their reading and writing skills can be adequately developed. Major barriers include motivational problems, the competing demands of family and work, instruction that is not interesting or is irrelevant to adults. Pressley and others cite the need for research on strategies that successfully retain adults in literacy programs and those that are appropriate to their successful learning.

Literacy problems also encompass the growing number of individuals with limited ability to speak, read, write or understand the English language. "By the year 2000, an estimated 17.4 million limited English proficient adults will be living in the United States" (*Teaching Adults*, U.S. Department of Education, 1991). "Adult ESL participants include permanent residents of the United States, refugees, migrant workers and immigrants." (U.S. Department of Education, *Fact Sheet #3*, 1991).

Unlike the immigrants of the 1970's, some groups of immigrants of the 1980's, and increasingly in the 1990's are educationally disadvantaged. Many cannot read or write in any language; some have the equivalent of a few years of formal education and minimal literacy skills; still others are literate in their own languages, but need to learn the Roman alphabet as well as English. For example, the number of Hispanics who lack literacy skills in their own language is growing rapidly. More than 7 million Hispanics in the United States age 16 and older, 50 percent of all Hispanic adults, are functionally illiterate. More than 200 thousand are added to this pool each year as a result of immigration and high school dropouts (*Teaching Adults*, U.S. Department of Education, 1991).

In summary, we are aware today that there are multiple ways of conceptualizing literacy. While we can measure adult literacy in many contexts, there is still no universal acceptance of what makes for a literate person in today's complex society, especially among linguistically and culturally diverse populations. However, there is general agreement that, there is no single measure or specific point on a scale that separates the 'literate' from the 'illiterate' (Kirsch, 1986). While we know that literacy instruction produces positive results, we are a long way from understanding how to improve

instruction for the diverse population of adults whose lives would be greatly enriched through improved literacy skills.

The Global Economy: Goal 5 implies that the ability of the United States to compete in the global economy is dependent, to a large extent, upon improving the education and training of its work force. Although, it is clear that education is but one factor among many, the role education can play in enabling people to learn and adapt to changing environments is considered crucial in solving complex economic problems. This discussion briefly sketches some major education issues that must be considered as we prepare an American workforce for the year 2000 and beyond.

The first is that nearly 85 percent of America's workers who will be working in the year 2000 are in the work force today (Osterman, 1991); in view of emerging technologies, continuous learning will be necessary not only for global competitiveness, but to meet the minimal needs of the American economy.

Although job openings are expected to occur at all levels of education and training, opportunities to advance into higher paying occupations will generally require postsecondary education (Silvestri and Lukasiewicz, 1991). In addition, entry level workers are increasingly minorities, many of whom have educational deficits that may prevent them from performing well in the workforce or from moving into higher paying jobs (GAO, 1992). If we fail to educate minorities, not only the next generation, but also the economy as a whole will be short changed (Baumol, 1991).

In the global market, the U.S. economy is facing stiff competition as other advanced industrial nations are able to challenge U.S. products and services. In order to realign U.S. institutions to be responsive to the changing nature of work, our educational institutions have to change the way they teach and what they teach dramatically. For example, at the turn of the century the U.S. economy had factories which were organized so that most workers did not need to think. Thinking was for managers, while most workers followed simple instructions. Today, a productive worker not only needs to think, but must, "bear the primary responsibility for quality control, for product scheduling, for his or her own supervision" (Marshall & Tucker, 1992).

In summary, it is obvious that a sound economy will require approaches to post compulsory education that will not only continuously upgrade skills and knowledge at all levels of the workplace, but develop thinking and communication skills in work settings as well as in formal institutions of learning.

Citizenship: What are the knowledge and skills needed for citizenship? In the broad view, citizenship behaviors are defined as being knowledgeable about and competent in the nation's political, economic, legal and social systems (Callahan and Banaszak, 1990). While some writers include one's functioning as a parent or family member, the most common definitions resemble Patrick's (1991) which defined responsibilities of citizenship as "obligations to contribute to the common good by performing duties to benefit the community (e.g. . . .to vote in public elections or serve willingly as a juror)." However, definitions of civic responsibility appear to be more prevalent than definitions of skills and abilities to be assessed. Morse (1989) defines citizenship, as consisting, in part of of "public judgment" or "the capacity to think with others about collective lives and actions,"

which "requires the ability to talk or imagine different viewpoints and perspectives with others."

Declining voter participation rates have been cited as an indicator of declining citizenship. For example, the United States ranks last among democratic nations in voter turnout (Gans, 1987; 1988). Significantly, the largest drop in voter turnout accompanied the lowering of the voting age to 18. Participation fell from 60.8 percent in the 1968 presidential election to 55.2 percent in the 1972 election and has been steadily declining to 50.1 percent in the 1988 election (Kimberling, 1992). Voting turnout is even worse in the non-presidential election years, with only 36.4 percent of Americans voting for the highest office in 1990 (Kimberling, 1992).

Another indicator cited for poor citizenship is lack of "volunteerism." In 1988-89, only about 11 percent of 20-24-year olds were volunteers compared with 29 percent of 35-44-year olds (*Youth Indicators*, 1991, p. 125). However, age comparisons may tell us more about developmental stages of adult concerns than about citizenship.

While voting and volunteerism may reflect aspects of citizen involvement in social institutions, it is not clear what this means for citizenship knowledge and skills. More relevant might be the actual assessments of civic knowledge of young adults. NAEP studies, for example, indicate that the majority of 12th graders in 1988 had only a rudimentary knowledge of government and citizenship and that they did significantly less well in civics knowledge than their counterparts tested in 1982 by NAEP. A survey of American youth ages 15-24 conducted by Peter Hart (1989) revealed such basic characteristics as lack of understanding about what it takes to preserve freedoms; less involvement and interest in public life than the previous generation; and feelings that family, school and government have let them down. Callahan (1992) in reviewing data on indicators of declining citizenship among young adults, found a lack of familiarity with the Declaration of Independence and the Constitution, inability to identify political leaders, focus on self rather than community, and lack of concern for keeping up with political affairs.

There is evidence that education is related to some aspects of citizenship behavior. Surveys indicate that college graduates were 67 percent more likely, and high school drop-outs were 52 percent less likely, to vote than high school graduates. (*Condition of Education*, 1992). Of course, we cannot interpret these data as indicators that education causes people to vote. There is little consensus on what constitutes knowledge for citizenship or on curricular areas likely to contribute to good citizenship. The CIVITAS project, developed through the Center for Civic Education, declares that civic education "should consist of the intensive study and understanding of the nation's system of self-government, its values, commitments, and assumptions, and its relevant history; in short, it should involve the theory and practice of a free and open democratic society. . ." (Charles Bahmueller, ERIC Digest, 1992). Clearly more work will need to be done in preparation for research and instruction in this area.

OBJECTIVE ONE:

Every major American business will be involved in strengthening the connection between education and work.

Analysis of the Problem: Students who graduate from high school or leave school after the compulsory attendance age and attempt to go to work often have trouble making the transition to employment. In 1990, almost a third, 32 percent, of those recent high school graduates who were not enrolled in college were either unemployed or not looking for work. The transition is worse for blacks. Only 45 percent of those black recent high school graduates were employed in 1990, compared to 75 percent of white graduates (Condition of Education, 1992). It is believed that a number of factors contribute to this problem. Lack of knowledge or skills coupled with behavioral and attitudinal problems constitute some of the major barriers. Other barriers appear to be the employers' unwillingness to hire youth and train them in apprenticeship programs (Tan, 1991). Yet another barrier is the lack of feedback from employers to schools as to what they want their employees to know and be able to do. Though European employers, who typically pay much of the cost of these training programs, believe that their apprenticeship programs gives them a major competitive advantage over their rivals, U.S. employers continue to train 25-44-year olds rather than younger employees (Stacey and To, 1990).

One often mentioned remedy for improving schools is the closer integration of schools and workplaces. From different standpoints, educators, sociologists, and economists all argue that closer school-work relationships could be used to increase the relevance of the high school curriculum, enhance student motivation, and improve the transition from school to work. Most young people "bounce around" for several years in the process of finding a good job. There is a growing consensus among researchers that better-structured relationships between schools and workplaces are needed to address this problem (Barton and Fraser 1980; Hamilton, 1986; Stern, 1989).

Today there are a number of programs that attempt to connect workplaces and schools. Close to a million students each year enroll in cooperative education programs in high schools and, to a lesser extent, in two-year colleges. There are a small number of school-to-apprenticeship programs that permit students to become registered apprentices while they complete high school (Stern, 1990). There are also school-business partnerships. During the school year 1987-1988, 52 percent of all educational partnerships were sponsored by businesses. These are distributed across businesses of all sizes: 14 percent were large businesses, 16 percent medium size and 22 percent small businesses (Otterbourg and Adams, 1989). Overall, 70 percent of public schools were in partnership with a business during the same school year. Between 1983-84, and 1987-88, the number of business-education partnerships rose from 42,200 to 140,800. In spite of the proliferation of school-business partnerships, the research base remains mostly descriptive.

There are examples of various kinds of school-business partnerships in urban and rural areas across the country. These can be classified in numerous ways, but since partnership activities are diverse, they resist simple categorization. One can look at them by type of partnership, by type of program, or by type of student. One can also focus on who initiates them, and who finances them.

One of the best ways of organizing school-business partnerships is by "levels of impact" (Grobe, 1990). In examining partnerships under these categories, we look at the outcomes that such involvements produce. Articulation of goals at the conception of such programs is very important, since partnerships should be established to achieve goals; such goals need to be clearly stated and "clear-sightedly measured" (Grobe, 1990). Some goals may be time-limited, while others may be moderately complex and multi-dimensional. The significant lesson is to identify the appropriateness of each partnership for the needs of the community. For example, IBM takes 4,000 young people to Yankee Stadium each year as a reward for improved attendance. The impact of this program is relatively easy to measure. Schools involved with IBM can easily see whether more students improve attendance each year and whether the particular incentive is effective. On the other hand, the High School Academies model first developed in the late 1960's is more complex. These academies are three year schools-within-schools that address needs of disadvantaged youth by relating education more closely to the world of work.

Another kind of business involvement in schools is evidenced in advocacy. In 1985 the Committee for Economic Development (CED) issued guidelines urging business to advocate adequate public school funding, policies aimed at school improvement, and application of business strategies to education in the areas of cost/benefit analysis, human resources development, staff development and research and evaluation. Such efforts can be directed at the policymakers at the national, state, or local level. This type of involvement can affect the overall direction of educational reform. Frequently, the business involvement grows out of a working partnership between the public school, the city, the Chamber of Commerce, the Private Industry Council and other community organizations. In the case of Portland, Oregon, in 1984, "a Leaders' Roundtable" was formed which led to the creation of number of school-to-work transition programs for youth.

Another category of business activity involves demonstration in sending clear and appropriate signals to schools on curriculum and academic achievement. Lack of economic rewards for studying and learning is a fundamental problem (Bishop, 1992), since the U.S. labor market fails to reward effort and achievement in high school. Although studies have shown that competence in reading, mathematics, and science are strongly related to productivity in almost all jobs, the wages that employers pay do not reflect this. The wages of employees who demonstrate such competence are only slightly higher than those of employees who lack these skills (Bishop, 1992).

Employers prefer to hire high school graduates who have work experience, because the applicant's work record serves as a signal of competencies and reliability that helps an employer identify qualified job candidates. Unfortunately, most recent U.S. high school graduates have no records that reflect work experience while in school.

Research Findings: Business involvement in educational institutions has proliferated due to problems with the products of public education and the perceived need for better educated employees (Levine and Trachtman, 1988). Other sources indicate that school/industry collaborations have emerged because they act as catalysts for wider support for public education. They can also provide at-risk and other youth with experiential evidence of the link between academic achievement and eventual employment (Public/Private Ventures, 1987). In the area of business involvement in schools, there is a large number of demonstration projects, mostly in their early phase of development.

Preliminary analyses from a survey of approximately two dozen school-business partnerships indicate that only a quarter of the programs reported using outcomes data to measure effectiveness and about 20 percent were planning to conduct an evaluation in the future. The remaining 55 percent were primarily using questionnaires and surveys to elicit feedback from participants. (Otterbourg and Adams, 1989). Therefore outcomes will need to be better defined at the outset and information, collected accordingly.

The review of research shows that most available data are descriptive. Also, most projects are still in the design and development phase, and have not been evaluated. However, a few programs that have existed for a long time have been evaluated. For example, the Pittsburgh Cooperative Work Experience Program involving Rockwell International, Alcoa, Equicor, Veteran's Hospital and other small companies was established in 1972. Another long-time program is the St. Louis-Work Study Program, which is open to any student who meets minimum requirements. This program has the support of Ralston Purina, McGraw Hill, Citicorp, Community Based Banking, Shell Oil, St. Louis City Hall and Amoco. The results of assessments of the long-term collaborative programs indicate that partnerships "enabled schools to better serve at-risk youth" by providing increased access to employment/work experience, job coaching and preparation, and increased personal attention (Public/Private Ventures, 1987).

In order to strengthen the commitment of business to schools, we need to examine a number of issues. But, even prior to that, we need to establish that we have empirical evidence that business commitment to education is indeed good for students. In other words, we need proof that employers' involvement with educational institutions has positive influence on students' learning.

Needed Research: Following is a list of questions based on the review of literature, available research syntheses and summaries of programs.

- To what extent and in what ways do school-business partnerships benefit students, e.g., how do they effect learning and careers?

- To what degree are employers obtaining information on high school accomplishments of job applicants and using this information when they make hiring decisions? What evidence is there that this is increasing over time? To what extent are students aware of what employers are doing in this regard? To what extent does this awareness influence students' study behavior?

- What evidence exists of intended and unintended outcomes of business-school partnerships that produce changes in the behavior of either party in a tangible way? In what, if any, ways are these outcomes related to the type of business or school?

- How can business involvement in schools and other educational institutions be differently defined? What examples can be found, either in the U.S. or outside the U.S., that differ from "partnerships" but produce desirable outcomes of linkages between schools and businesses?

- What mechanisms can be developed to assist employers in providing feedback to schools about the performance of their graduates? What impact does such feedback have on schools and their students?

- What measurements can be developed that reflect a student's level and quality of effort?

- To what extent do schools perceive a trade-off between standards and relevance, i.e., a concern that too much time spent on business links will compete with time for general learning? How do they resolve such conflicts? How do our foreign trading partners manage such conflicts?

OBJECTIVE TWO:

All workers will have the opportunity to acquire the knowledge and skills, from basic to highly technical, needed to adapt to emerging new technologies, work methods, and markets through public and private educational, vocational, technical, workplace, or other programs.

Analysis of the Problem: One of the most often-cited problems of the U.S. economy is the time it takes for innovation to be translated into production. Recently, numerous reports have raised the issue that the United States lacks the necessary human capital to solve this problem. The new technologies demand multiple sets of knowledge and skills; traditionally we have expected people to attain this knowledge and skills through postsecondary education. But, in recent years, postsecondary education has been less able to fulfill this need due to students being less well prepared by secondary institutions. Therefore, to help adults become productive members of society, retraining and access to retraining, both in and out of workplaces, have become crucial issues to be dealt with in our society.

Until recently, most work places were organized around tight divisions of labor and narrowly designed, specialized jobs, with supervisors performing the decision-making on how the jobs were to be performed, how work was to be scheduled and how workers were to be judged. In contrast, in today's more productive workplaces, jobs are structured in a more flexible way that emphasizes the importance of direct employee participation, teamwork, skills training, and an understanding of the organization's goals and objectives. These workplaces are described as "high-performance" work organizations, and their numbers are few. Most firms have been struggling to move from traditional to more viable alternatives. One of the obstacles in this transition has been employees' lack of necessary skills to function in high-performance work organizations: when given the opportunity to participate, they don't know what to do or how the organization works (Osterman, 1992).

Another reason for increasing demand for an educated labor force is the shift from a goods-producing economy to a service-producing economy. As was the case for the transition from an agricultural economy to a goods-producing economy, each transition has increased the demand for educated labor (Rumberger and Levin, 1989). Direct employment in the manufacturing sector peaked during the 1940's when 4 out of 10

Americans worked either as craft persons or as operatives and laborers. By 1988, the proportion had fallen to 28 percent. The percentage of Americans employed in managerial, sales, clerical, professional, and technical operations rose from 18 percent of the working population in 1900 to 56 percent in 1988. Since 1900, professional and technical workers' share of employment has increased by 12 percent, a rate of growth exceeded only by the clerical occupations (Barley, 1991).

The Bureau of Labor Statistics projects that professional and technical occupations will be the fastest growing segment of the labor force (Silvestri & Lukasiewicz, 1991). By the year 2005, professional and technical workers are projected to account for more employment (18 percent) than any other segment of the economy.

The change in the nature of jobs is just as important as the proliferation of types of occupations. New technologies have created new jobs. For example, computational technologies do not simply automate, they also "informate" (Zuboff, 1985). This means, that such computational technologies allow their operators access to previously unavailable information and require skills that have not normally been expected of a machine's user (Barley 1991). For example, blue-collar workers in computer-integrated paper mills have to learn to analyze data and then make decisions based on their analysis in order to control the production process effectively. There are similar findings from other occupations, such as machinists and operatives in manufacturing plants that have adopted computerized numerical control and other forms of computer-automated manufacturing (Majcrzak, 1988).

In a totally different environment, technological changes are also having their impact on employees. A pilot study of secretaries in universities suggests that the spread of personal computers among faculty members is slowly shifting the secretary's work toward that of a research assistant (Barley, 1991). In the past, such skills were expected of mid-level managers, now these are part of the necessary skills of first-line workers.

In summary, the workforce changes appear to be driven by: (1) the rate of introduction of change due to technological advancement, (2) change from rigidly defined, narrowly designed workplaces to "high performance" work organizations, (3) transition from a production economy to a service economy, and (4) changes in the nature of industries which increase the demand for members of existing professional and technical occupations. These changes not only create the need for a better educated workforce, but also challenge the ways in which workplaces are currently conceptualized and organized (Barley 1991).

The above set of issues all deal with a demand created by changes in the workplace. Examination of wages to see if there are changes in returns on education is another way of looking at the demand. If education is a proxy for skills and returns on education are rising, then one can infer that the demand for skills is also rising (Osterman, 1991). For example, in the 1980's, the earnings of college graduates relative to high school graduates more than doubled (Blackburn, Bloom, and Freeman (1989). There is also evidence of increased dispersions of wages within educational categories (Murphy & Katz, 1990). Individuals with more formal education also receive more training and experience greater wage growth (Mincer, 1990, Lynch, 1990).

In summary, occupational projections and labor market signals, such as higher wages for some jobs, suggest increases for some skills in the coming decade. To insure that everyone has access to education and training and retraining programs, both private and public institutions, formal and informal programs and small and large businesses must provide appropriate learning experiences. Information on access must include the cost, quality of training and transferability of education and training provided by these institutions. For example, the percentage of courses on other-than a full-time basis offered to adults by schools and colleges fell from 61 percent to 53 percent, while those of nonschool-based providers--business, industry, government, and labor or professional organizations--increased from 39 percent to 47 percent, from 1969 to 1984. Noticeably, business and industry provided about 17 percent of the adult education courses (Stacey & To, 1992). Nonschool-based providers are becoming more important in the adult education and training market than they were before.

Although the conventional human capital model of education indicates that workers who are educated are more productive and therefore better paid, this pattern does not hold true for some occupations. For example, technicians who support engineers, nurses who help doctors and administrative assistants who support high-level managers and are trained in community colleges and technical institutes receive fewer benefits from training or education than the professionals they support. It is possible for the benefits not to accrue to the individual trained but to others (Stern & Grubb, 1988). On the other hand, if employers select individuals to receive education and training sponsored by the employer, due to its "signaling" role, the individuals are likely to receive higher wages (Mincer, 1989).

The research shows that males are more likely to receive employer-sponsored education and training than females. Twenty- four percent of men report receiving qualifying training in a formal company program as compared to 17 percent of women (Lynch, 1991). A preliminary scanning of research shows that there are important issues to be examined in encouraging the development of systems of recurrent education that will provide not only access, but access to quality programs for adults who need lifelong education and training.

Research Findings: In order to effectively discuss access to retraining issues for adults, we could review the research on the rate of return to individuals who invest in education or on education's contribution to productivity. Since there is very little research on education's contribution to productivity and what there is has raised more questions than answers, it is more appropriate at this time to concentrate on the rate of return to the individual.

Initial findings on the economic benefits of investing in human capital via education led to an explosion of research both here and abroad on the effects of schooling on individual earnings, on rates of return on investment in schooling, and on education's role in stimulating more rapid growth (Dean, 1984). Some of the returns on education may not be in the form of wages but may be reflected in such factors as health (Wolfe & van der Gaag, 1981), fertility (Easterlin, Pollak, & Wachter, 1980), and future earnings of children (Marin & Psacharopoulos, 1976; Tinbergen, 1975; and Pechman, 1970).

For the purpose of discussing this objective, we shall concentrate on the return on different levels of education as indicated by employment rates and the wages received.

For example, 92 percent of 25-34-year-old men who graduated from college were employed in 1991, as opposed to 85 percent of high school graduates. For white male college graduates 25-34 years old, the premium as reflected in wages increased from about 15 percent during the last half of the 1970's to about 40 percent in the last half of the 1980's and 1990. For black males the college premium was even larger. The earnings premium of college graduates in recent years, 1985-1989, was the highest of the 1975-1990 period (*The Condition of Education*, 1992). Labor market opportunities for women grew enormously between 1971-1990. The wage differential between students with two-year degrees and those with four-year degrees has gone up, but not as much as the college/high school differential. Some possible reasons for the less educated currently to have a higher unemployment rate include:

- The less educated have lower productivity (Mincer, 1989).

- The less educated have a harder time using labor market information and tend to be less mobile (Hong Tan, 1989).

- Flexible-system production depends on employees' skills, especially their capacity for learning on the job. The less educated have more to learn and therefore are likely to slow down the process of change (Reich, 1983).

- High-tech industries tend to hire people with more years of schooling. In 1980, the most recent year data are available, 20 percent of those employed in high-tech industries had 16 or more years of schooling compared to only 11 percent in traditional industries (Bartel & Lichtenberg, 1989).

- More than half of the net employment growth between 1976 and 1988 took place within occupations requiring higher levels of education.

In summary, it appears that as long as there are economic incentives for adults to acquire further education and training, even if the evidence on the returns to the economy is not directly attributable to education, some adults will continue to get more education and training. The demand for further education and training due to changes in the economy remains to be examined.

Needed Research: Following is a list of questions based on the review of literature, available research syntheses and summaries of programs:

- What are the rates of return of different types of investments in education and training for adults?

- What evidence do we have of the scope of changes that are taking place in work methods that require a substantial degree of communication and math skills?

- What historical evidence do we have to indicate that the rate of technological change has accelerated? What evidence do we have of the type of skills that will be needed in growth industries and occupations?

- To what extent do various workplaces (public/private, small/large, high-tech/low-tech, service/manufacturing) provide opportunities for acquiring post-compulsory education and training for adults?

- What are the benefits to firms of providing further education and training to their employees?

- What evidence do we have to show which sector should provide what kinds of education and training? What type of institutions are most suited to handle which role in education and training the nation's workforce?

- Are there existing training models that may shed some light on productivity issues in the workplace?

OBJECTIVE THREE:

The number of quality programs, including those at libraries, that are designed to serve more effectively the needs of the growing number of part-time and mid-career students will increase substantially.

Analysis of the Problem: This objective recognizes that much of adult learning occurs in the context of part-time programs that vary widely in the degree to which they are organized and controlled for quality. It is difficult to categorize part-time learners, since they often fall into more than one category at any one time, and certainly at different times in their lives (Courtney, 1989). Part-time learning activities also occur in diverse settings, such as two- and four-year colleges, community programs, work-related settings, the home, and a host of nonformal settings.

At the community level, an important provider of education for adult, part-time learners has been libraries. The 1966 Adult Education Act provided support for public libraries to work with public schools in providing adult basic education programs. Over the years public libraries have provided exhibits, guided reading through bibliographies and direct assistance, and provided assistance to community group studies. Monroe and Heim (1991) in reviewing the role of libraries in promoting adult literacy and learning over the past 25 years, note that they are likely to become even more important for part-time learners as new technologies are incorporated into library programs.

Research Findings: Estimates vary as to the number of adult part-time learners in the United States in any given year. In its first large-scale, nationally representative study of the educational activities of adults, NCES found that 38 percent of adults age 17 and over, excluding those enrolled full-time in high school, participated in some educational activity over a 12-month period in 1990-91. Of these, 31.6 percent participated on a part-time basis. (Korb, Chandler and West, 1991)

Little is known about predicting the career and education paths of people who engage in formal or informal part-time learning during various periods in their lives. Data from the Bureau of Labor Statistics (June 30, 1992) indicate that many American adults who are engaged in postsecondary education are already in the workforce and are part-time learners. Of the 31.2 million youth 16 to 24 years old in October 1991, about half were

enrolled in either college (8.3 million) or high school (7.2 million). For those enrolled full-time in college, 53 percent were generally working part time or looking for a part-time job. However, among part-time students, 91 percent were in the labor force. The National Center for Education Statistics (1990) found that 44 percent of all undergraduate students were enrolled part-time. Of those undergraduates enrolled at two-year institutions, 66.5 percent were enrolled part time (National Postsecondary Student Aid Study, unpublished data, 1990). It is clear from these studies that many Americans who are engaged in postsecondary studies spend part or most of their time working, and that most of these enrolled in two-year institutions are likely to be part-time learners.

However, while there is apparently an increasing need for postsecondary students to balance their time between work and education, opportunities to do so vary across the nation. While 56 percent of U.S. colleges and universities reported an increase in part-time students (1989 *Almanac of Higher Education*), most of this in two-year institutions, there were great disparities among the states in the opportunities available for such students (Mikulecky, 1990). Stacey and To (1990), in reviewing education and training providers that serve adults, found that while postsecondary institutions are major sources for learning, there has been a dramatic increase in employer provided education, with community colleges increasingly serving workplace needs.

Charner and Schlossberg (1989) studied policies and practices that increase opportunities for "worklife education and training," defined as "a process whereby individuals, 17 years old or older who are moving into, through, or out of the workplace, undertake formal or organized instruction/activities with the intention of bringing about changes in information, knowledge, understanding, or skills" (p. 3). Their findings indicate that participation in such education is related to such factors as age, race/ethnicity, prior educational level, income, employment status, and type of education. They conclude that adults most in need of worklife education and training (i.e., those 55-64 years old, black and hispanic having less than a high school education, with incomes of less than $10,000, unemployed, or in lower paid, lower skill occupations, are least likely to participate.

Findings from NCES support earlier findings of Aslanian and Brickell (1980) that adults who could benefit from participating in education are least likely to do so, that is, adults with a 12th grade education or less, who were not employed, or whose households were at the lowest income levels (Korb, Chandler, and West, 1991). In addition, Valentine and Darkenwald (1990) found that nonparticipants are deterred by personal problems, lack of confidence, educational costs, lack of interest in organized education, or lack of interest in available courses.

Charner and Schlossberg (1989) found that among the situational barriers most often cited for nonparticipation by adults are costs of education and lack of time. However, the structural barriers (policies or practices of organizations that discourage participation) often cited by part-time students are admission and financial aid policies that discriminate against part-time students, availability of advisors in the evening and class scheduling. In addition, lack of information (particulary for adults with lower levels of education) may be a critical factor affecting adult participation. From their analysis of barriers Charner and Schlossberg (1989) suggest that the education/ training system is not dequately serving the needs of those adults who are most "at risk."

In their study of a representative sample of adults enrolled in college credit courses, Aslanian and Brickell (1988) found that the top-ranked services wanted by adult students fell into three categories: logistical ease, financial help, and career connections. For example, they wanted to spend their campus time inside classrooms rather than waiting in lines; they wanted practical applications of classroom material; and they wanted financial subsidies, since only 40 percent got help from their employers.

We are also beginning to understand more about how adults learn throughout their lifetime and how we can serve their learning needs. For example, Merriam and Caffarella reviewed seven theories of adult learning, each having strengths and weaknesses, and each framing ongoing research in adult education. They extracted four components of adult learning from these theories: (1) self-direction or autonomy as a characteristic or goal of adult learning; (2) breadth and depth of life experiences as content or triggers to learning; (3) reflection or self-conscious monitoring of changes taking place; and (4) action or some other expression of the learning that has occurred (Merriam and Caffarella, p.248).

In summary, adult learners are increasingly engaged in part-time learning especially related to worklife factors. Although providers of education for part-time learners are diverse, postsecondary institutions appear to be major providers. Those adults with the greatest need for education experience the most barriers in postsecondary and other education settings. While we are beginning to understand more about incentives and barriers to adult learning, more research is needed on approaches to providing relevant and high quality education for adults, especially during times of life transitions.

Needed Research: The following are some of the major questions for which research on part-time and mid-career students are needed:

- What contexts, formats, and delivery systems would be most useful for serving the education needs of various segments of the adult population at critical times in their lives?

- What approaches can be used to reduce barriers and strengthen incentives to participation for those adults most in need of literacy and worklife education and training?

- What can be done to enhance collaboration among business and industry, community agencies and post-secondary institutions to educate mid-career and part-time students? How can new technologies be used to improve access and quality of programs for these learners?

- How can knowledge from research on adult learning be incorporated into instructional programs to better serve adults who are increasingly older, and ethnically and culturally diverse and who tend to be part-time learners?

OBJECTIVE FOUR:

> *The proportion of those qualified students (especially minorities) who enter college, who complete at least two years, and who complete their degree programs will increase substantially.*

Analysis of the Problem: Historically, higher education has been viewed as a place where people can be educated to be "leaders and provide for the welfare of society (Rudolph 1962)." Objective 4 is based on the assumption that college degrees represent achievement of knowledge and skills needed not only for leadership, but for the good of the economy. As was emphasized earlier, the workforce increasingly will need people with the thinking skills and capability to cope with rapid technological advances and change.

This objective recognizes that postsecondary institutions need to do a better job of recruiting, retaining and graduating minority students, primarily for reasons of economic competitiveness, but also for the welfare of the individual. As noted earlier, the proportion of minorities in the United States is increasing rapidly and will be a significant part of the workforce in the year 2000. Since high school graduation rates and college-entry rates tend to be significantly lower for minorities, this group will be undereducated for the requirements of the workplace in the year 2000.

However, collection and analysis of data on the enrollment and retention of minorities are complicated by the tendency of researchers and policy makers to treat people of color as a single group, having experienced the same barriers to education. Many factors such as preparation for college, language proficiency, immigrant or nonimmigrant status, financial condition, and cultural influences, are among those that differ widely within and among groups. These differences must be better understood if cultural diversity is to be achieved in postsecondary and higher education. (Astone and Nunez-Womack, 1991).

Assessments of student enrollment, and retention in degree programs are complicated by the diversity of postsecondary institutions in America. Institutions granting degrees or certificates include junior colleges, vocational and technical institutions, community colleges, and four-year colleges and universities. It is difficult to track student progress, especially when students transfer to other programs within or among institutions; part of this difficulty is in assessing comparability in quality of programs and instruction. These problems are further complicated by lack of consensus on the notion of "qualified students," as stated in objective 4. Qualifications for entrance and retention vary among institutions, with some placing more emphasis than others on such indicators as high school grades and standardized test scores.

Research Findings: It is clear that despite a decreasing number of high school graduates in the last decade, these has been a steady increase in higher education enrollment, reaching a record high of 14.2 million students in fall 1991. Eight out of ten two-year institutions and two-thirds of four-year institutions reported increased numbers of applications (El-Khawas, 1992).

Higher education enrollment had increased very rapidly (41 percent) between 1970 and 1980; the increase slowed (to 11 percent) between 1980 and 1989. These increases were reflected largely in part-time enrollments (*Digest of Education Statistics*, 1991). Since

1980, overall enrollment in institutions of higher education increased by about 13.4 percent (Shantz, 1992).

It is clear that the characteristics of those enrolled in higher education have been changing, especially over the last decade. The numbers of older students (those 25 and over) rose 34 percent between 1980 and 1990, while those under age 25 increased by only 7 percent (*Digest of Education Statistics*, 1991). During 1991-1992, 6 in 10 institutions reported continued increases in enrollments of students who are 25 and older (El-Khawas, 1992). Since 1980, there have been overall increases in enrollments for all racial/ethnic groups in higher education, but especially for Asian or Pacific Islanders (94 percent); Hispanic (61 percent); nonresident alien (30 percent); and American Indian or Alaskan Native (23 percent). In contrast, black enrollment increased only 10 percent and white enrollment only 9 percent (Shantz, 1992).

Many students of traditionally younger college ages apparently delay enrolling in college or delay completion of degrees. About 55 percent of the students who enrolled in private 4-year colleges in 1980 earned a bachelor's or higher degree by 1986, while 46 percent in public 4-year colleges did so (*Digest of Education Statistics*, 1991). Pointing out that the nation currently experiences large losses of talent, the Educational Testing Service (1991) reported that only half of the nation's high ability high school seniors in 1980 (those in the top 25 percent of national test scores) received a bachelor's degree by 1987.

A variety of factors appear to account for decisions to delay enrollment and degree completion, the most important of which is cost. Between 1979 and 1989, charges at public colleges have risen by 109 percent and charges at private colleges by 145 percent; these increases greatly surpassed the rise of 64 percent in the Consumer Price Index during that same period (*Digest of Education Statistics*, 1991).

Conclusions from the American Council on Education's 1991 Survey (El-Khawas, 1992) support the fact that financial factors have impacted heavily on institutions and on students:

> Financial issues dominate any description of the status of American colleges and universities during 1991-92... Most noticeable are cutbacks in spending on buildings, equipment, and library acquisitions and reductions in the number of courses or course sections offered... (p. 15)

Increased tuition charges are another widespread response to financial pressures, with potential but as yet unclear effects on enrollment. In the ACE survey, some administrators reported that increasing numbers of students are adjusting their study arrangements for financial reasons, whether by taking a semester off, studying part-time or otherwise taking longer to complete degree requirements. Administrators at two-thirds of all institutions also reported that increasing numbers of students are requiring full financial support (El-Khawas, 1992, p.15).

Other factors related to college enrollment are associated with college preparation. For example, studies by Pelavin and Kane (1988; 1990) sponsored by the College Board's project on educational equity, indicate that the taking of college preparatory mathematics courses in high school is strongly assocated with college attendance.

What do we know about the factors related to minority completion of degrees? Carter and Wilson (1991), using data from the Bureau of the Census, found that the numbers of American college-age youth (18-24 years old) dropped from 1980 to 1990 by 14 percent, including decreases of 16.7 percent among whites and 5.4 percent among African Americans. However, there were increases of 35.2 percent among Hispanics. However, in 1990, 32.5 percent of all whites in this age group, compared to 25.4 percent of African Americans and 15.8 percent of Hispanics, were enrolled in college.

Pelavin and Kane (1990) found that while the gap between minorities and whites decreased between 1964 to 1986, the data on college completion show a gap growing wider over time. Carter and Wilson (1991) reported that African Americans and Hispanics earned fewer undergraduate engineering degrees in 1989 than in 1987, led by a decline of almost 9 percent for African American men. African American men also received fewer degrees in education, health and life science at the bachelor's level.

To date, there has been little research on ways of changing the rate of minority degree completion, except for in-depth case studies (Richardson and Skinner, 1991) and evaluations of successful efforts to improve achievement of degrees by minorities at predominantly white institutions (Crosson,1987). Characteristics of success include strong policy leadership at the state and institutional levels regarding minority recruitment and retention; strong programs for academic preparation and remediation; strong relationships with elementary and secondary school on pre-collegiate programs, multicultural environments, proactive approaches to financial aid and on-campus housing.

However, there is some evidence that institutions are attemping to increase minority participation. During 1991-92, 53 percent of the representative sample of institutions surveyed by the American Councel on Education, reported increases over the previous year in enrollments of African-American students, and only 9 percent reported decreases. Almost half of the institutions also had increased enrollments of Hispanic and Asian students, while one-quarter increased their enrollment of American Indian students (El-Khawas, 1992). Since 1990, gains have been made in the proportion of campuses using strategies to increase minority participation. These include tracking minority student attrition and completion rates; developing plans for increasing minority participation; and holding student and faculty workshops to increase racial and cultural awareness. However, ACE also found that a substantial number of institutions have not taken such steps; for example, three in ten have not developed a comprehensive plan for increasing minority participation (El-Khawas, 1992).

Data from the Educational Testing Service (1991) indicate that decisions of minorities to enroll in graduate school are related to students' undergraduate grade point average, level of debt, and socioeconomic status. Those minorities satisfied with their doctoral programs tend to complete them and to report that they felt little institutional discrimination and a high degree of support and encouragement from a mentor.

In summary, while enrollments in higher education have increased in the past decade, there are wide variations in increases among racial/ethnic groups and gaps between whites and minorities in degree completion. Increases in enrollments of students over age 25 were almost five times greater than those under 25, reflecting delays in enrollment and degree completion by many high school graduates, attributed, in large part, to financial factors such as increased costs and less institutional and state support for

education. There is evidence that changing institutional and state policies and practices are important in increasing minority participation and achievement in higher education.

Needed Research: The following questions need to be addressed by research:

- Which state and institutional policies work best to change the enrollment, retention and degree completion rates of all students, particularly minorities? How can these be translated into specific actions and implemented across diverse kinds of higher education institutions nationwide?

- What are the indicators of institutional success for postsecondary schools, particularly with respect to successful integration of minority students into various programs? How can these be measured? How can institutions perform better on these indicators?

- How can elementary/secondary schools work with higher education to ensure success for all students, but particularly minority students, in completing postsecondary degrees? What are the barriers, in addition to cost, for students in various cultural groups? How can these be reduced?

- What can institutions do to reduce the costs of attending college without sacrificing program quality? What kinds of financial assistance work best for various kinds of students at various points in their lives to facilitate completion of college degrees?

- What is the impact of delaying college enrollment and degree completion on the lives of students, particulary as this relates to their participation in the work force?

OBJECTIVE FIVE:

The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially.

Analysis of the Problem: The language of objective 5 suggests a deficiency in the workplace and citizenship skills of college students. Complete information on the levels of achievement for college students in this regard are limited, although fragmentary evidence is available. As mentioned earlier, the Young Adult Literacy Survey (NCES, 1985) inventoried the basic and more advanced literacy skills of Americans aged 21-25. Although individuals with 2-year, 4-year and/or graduate degrees fared better than those less educated, many of these college graduates failed to accomplish rudimentary tasks: only 40.7 percent managed to use a schedule to select appropriate buses for given departures and arrivals (document scale); only 20 percent were able to estimate the cost of groceries using a unit-price label (quantitative scale); and only 19.4 percent had the ability to generate a theme from a short poem (prose scale) (Kirsch and Jungeblut, 1986).

A 1987 study of industry practices in hiring college graduates surveyed 535 large and mid-sized companies and found managers citing general analytical and communication skills as necessary qualifications for entry-level candidates, especially those seeking future

advancement. Two-thirds of the participants stated that those possessing the technical skills required most often lack these so called "generic skills" (Useem, 1989).

There is evidence of a desire and a willingness on the part of postsecondary institutions, academic associations, industry and governments to remedy these basic deficiencies. According to a 1991 survey of 359 postsecondary institutions by the American Council on Education, 81 percent currently have student outcome assessments underway. These include 24 percent in the area of critical thinking; 32 percent in the area of quantitative problem solving; 28 percent in oral communication; 56 percent in written communication; and 29 percent in long-term outcomes. Of the remaining institutions engaged in assessment, about 40 percent have future plans to assess students in the realm of critical thinking, problem solving and oral communication; 27 percent in written communication (El-Khawas, 1992).

There is considerable agreement, in both the literature and recent reports on the reform movement in education, that college graduates should be in command of higher order thinking and communication skills. Citations of learning criteria within specific disciplines consistently name critical thinking, problem solving and communication as core requirements. For example, the American Association for the Advancement of Science refers to these skills when defining "scientific literacy" for the population at large (American Association for the Advancement of Science, 1989). A recent publication of the Department of Education, *Signs and Traces*, (Adelman 1989), outlines assessment paradigms for five different programs of study, developed independently of each other by teams of faculty. All five include as a goal, in whole or part, the mastery of critical thinking, problem solving, and communication skills.

The American Association for the Advancement of Science, in its Project 2061: Science for All Americans, argues that it is not enough to have content knowledge. They suggest that "...knowledge should be understood in ways that will enable it to be used in solving problems." They build a strong case for the development of thinking skills within the science, mathematics, and technology curricula. Additional evidence can be found in goal statements of educational programs at various colleges and in state programs. Of course, there is less agreement on the specific nature of these skills and on the levels of achievement expected for each discipline regarding work and citizenship responsibilities.

As a final note it is important that the identification and teaching/learning of these skills be done in coordination with efforts at pre-collegiate levels. For example, objective 2 of Goal 3 includes essentially the same set of skill objectives for students in elementary/secondary schools as those outlined for objective 5 of goal 5. Clearly there needs to be a continuity in learning of these skills from elementary school through postsecondary education.

Research Findings: There is good evidence to suggest that communication skills and higher order-thinking are strongly related to occupational success. Graduates of postsecondary education are thought to need further refinement of their higher order thinking and communication skills; however, there is little knowledge as to the extent of individual or collective deficits. Baseline information for measuring the progress of attaining goal 5, objective 5, is generally lacking. Although tests such as the Graduate Record and Academic Profiles of the Educational Testing Service and the American College Testing Service's Comprehensive Outcomes Measures Program, among others,

include items which assess some of the identified skills, recent experiences suggest that further research as to their validity and reliability is necessary (Banta 1991). Researchers do agree that students generally lack even limited mastery of the targeted skills before entering postsecondary schooling. Ratcliff suggests that, in recent years, eighty percent of the four year colleges in this country have initiated outcomes assessment programs at some level. However, it is difficult to draw national comparisons since they use a variety of instruments and criteria (Ratcliff 1991) and the focus of the assessments differ (El-Khawas 1989).

The National Center for Education Statistics conducted a planning workshop in the Fall of 1991 to identify strategies for identifying and assessing higher order, problem solving and communication skills. Participants agreed that effective assessment is one part of a three-part strategy: identification of the skills; assessment of the skills; enhancement of the teaching/learning of the skills. Assessment can best be thought of as a means to determine progress and to identify incentives and/or barriers to effective teaching/learning of these skills (NCES, 1992).

Although it seems reasonable to identify higher order thinking and communication skills, independently of one another, clearly there is overlap. Research on effective writing and reading consistently include a critical thinking element (ERIC Digest, 1987). Communication skills include reading, writing, speaking and listening. One reason for splitting the research on communication skills away from higher order thinking skills is, that agreement on the communication skills for assessment is more advanced. A 1978 ERIC publication, *Assessing Functional Communication*, (Larson, Carl, and others, 1978) identified 90 different communication assessments used in early to later education. Additional documents on the assessment of reading and writing are available from the current National Research and Development Centers on Writing and Literacy at the University of California at Berkeley. In contrast, identifying and building a consensus for the skills necessary for problem solving and critical thinking have met with mixed results in the academic community. Examples include efforts to develop a consensus listing of critical thinking skills conducted through the American Philosophy Association by Peter Facione (1991); institutional-based projects cited by Loacker (1991), Mentkowski (1991), and Paul and Nosich (1991), and industry activities reported by Capelli (1992)

Another approach is to consider on-the-job skills that can be taught in the classroom. Capelli (1992) in reviewing industry approaches to identification of the skills needed through job analysis techniques, cited evidence to suggest that grades in general were not necessarily good indicators of future job success. However, grades related to an occupation can predict future job performance. Job performance skills must be anchored and skill proficiency levels defined and validated. Job analysis techniques have also been used by school systems to identify the link between school and work. Noteworthy are the activities of the Fort Worth Independent School District (Kane, 1991). Using this process they identified and then validated seven basic skills and corresponding levels of proficiency for workers served by the school district. Validation included skills and proficiency levels expected from both high school and college graduates.

The second part of Goal 5 focuses on the skills a citizen needs to function well in the society. Problems in research and assessment on this issue have been discussed in the introduction to this paper. In addition, Morse (1989) notes the relationship of citizenship skills to higher order thinking and communication skills:

> It is about using political talk, thinking, judgement, and imagination to create the capacity to act thoughtfully and prudently on critical public issues.

In summary, it appears that subject matter skill requirements in higher education, although applied differently, are generally consistent with skills needed in the workplace and in the practice of citizenship. In fact, some might argue that the overlap in higher order thinking and communication skills are far greater than are the unique skills within each.

With respect to assessing the skills of college graduates, it the more personal or individualized the assessment process, the more likely a true and unique assessment of student learning will result (NCES, 1992). Portfolios were identified as the most direct approach. The down side of the more individualized approach is that the costs of administering such efforts are necessarily greater with unknown reliability and validity. As assessments become less personalized, there is the additional requirement that the approach selected meet the joint technical standards of the American Psychological Association, the American Educational Research Association, and the Code of Fair Testing Practices (Code, 1988). Consideration needs to be given to such concerns as comparing the skills of college students or graduates with the skills of the non-college population. How much development can be attributed to maturation, job experience, and cultural and family background characteristics of the students? Finally the potential for "adverse impact" of tests and standards must be considered on all populations. Instruments must be controlled for background factors to get a true sense of learning in college. Lastly, for an assessment of the effectiveness of teaching/learning system to be valid, students need to be aware of skill expectations and standards (NCES, 1992).

With respect to instruction in critical thinking and problem solving, Greenfield (1987), in a survey of teaching thinking- through-problem-solving suggests:

> Some interesting and fairly dramatic efforts have been made both to teach problem-solving skills directly and to teach effective remedial problem-solving skills. These efforts differ as a result of the student's experiential background, the teachers educational theory, or the method of analysis used to determine the components of problem solving skills. Nevertheless, each effort, no matter what method has been employed for the teaching or remediating of problem solving skills, succeeds. No matter how problem solving skills are taught, no matter what educational level at which they are taught, the problem solving skills of the students to whom these skills are taught improve. (Greenfield, 1987, p. 20)

With respect to teaching/learning of communication skills (i.e., reading, writing, speaking and listening) a great deal of research has and is being conducted from the academic perspective (Speech Communication Association, 1990). However, since teaching for work and citizenship purposes might be thought of as broadening the focus, it is not the teaching/learning of communication skills from an academic perspective that this objective focuses on, but rather application of the skills. In fact teaching to the goal may be a more effective approach to the enhancement of writing since writers' perceptions of their audience is a central factor in effective writing (Brewer, 1980). Job analysis techniques can and have identified rather explicitly communication skills needs for the workplace. However linking these skills to college instruction generally has been lacking. It may be that the greatest barrier to the enhancement of teaching/learning of both higher order

thinking and communication skills is not with the lack of effective teaching/learning practices, but rather the lack of a commitment of faculty to enhance the teaching/learning of these skills from a workplace and citizenship perspective. There may be an even broader issue--whether faculty perceive higher education should have a skills-based orientation.

Needed Research: Several areas of concern, with implications for research, have emerged from the foregoing discussion. These research concerns hold for both the higher order thinking and communication skills (Goulden 1992). They include:

- A clear definition of higher order thinking and communication skills and related levels of proficiency needed by graduates as they relate to college teaching/learning and to work and citizenship;
- A reliable and valid national assessment strategy to assess these skills;
- A parallel strategy to feed back the results to all publics and to strengthen programs in colleges and universities and other providers of education and training.
- Identification of effective, reliable and validated teaching/learning strategies and practices.
- Identification of when and how these skills are best learned by various students.
- Identification of what is to be assessed and how; strategies or incentives needed to motivate students to participate in the assessment process; and incentives necessary for getting faculty to think in terms of using the results to improve teaching/learning of these skills.

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APPENDIX

SELECTED COMMISSIONED PAPERS

Directions for Research in Adult Literacy
Micahel Pressley and John T. Guthrie

Strengthening Connections between Learning and Work
David Stern

Outline of a Research Agenda for National Educational Goal 5, Objectives 1 and 2
Thomas Bailey

Minority Success in a Global Economy
Michael T. Nettles and Esther M. Rodriguez

Directions for Research in Adult Literacy

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1. Background

A variety of studies and types of data have documented that many young adults lack the foundational literacy and learning competencies that school is expected to develop. There is substantial evidence that many Americans lack basic literacy skills, mathematical understandings, and thinking strategies as well as the communication competencies necessary to work with others, acquire and use information, and understand systems as complex as many of the new technologies revolutionizing the work place. Critical workplace abilities, such as being able to locate and understand information in written documents, including manuals and tables, are underdeveloped in many adults. Many young Americans either are unable or unwilling to generate new ideas about how the world they live in, including their workplace, might function more efficiently. They are not prepared to function in workplaces that require great self-management as part of contributing to a complex organization of people and technology. We believe that the government should be concerned, for many Americans are not prepared to participate in an economy that requires high literacy and technological sophistication; they lack the intellectual capabilities required to use resources wisely, including time, money, materials, and the talents of those around them.

If the American economy of the early 21st Century is to be a high performance economy, many more adults must must be able to

interact with organizational and technological systems mindfully, capable of being more than a cog in the machinery, able to monitor their performances and adjust when they are not operating at optimal levels. Such adaptability requires great intellectual facility, including the abilities to communicate with others and machines (e. g., via interactive computer systems). Unfortunately, the evidence is overwhelming that many Americans are not prepared to meet these demands of the 21st Century economy.

2. Educational Sources of Adult Literacy Problems

Lack of development of these foundational competencies can be attributed to at least three sources. (a) Many with low learning and literacy competencies are high school dropouts; many with lower achievement than they are capable of dropped out of post-secondary institutions. Traditional schooling has not served these students well, with many failing given convetional educational structures and losing interest in traditional curricula. (b) Many of the foundational competencies for the 21st Century are not emphasized, or even covered in some instances, in traditional high school curricula; many of the most critical workplace competencies are not addressed well by many post-secondary institutions. In particular, students are not acquiring competencies in contemporary educational settings that mesh with the real-world demands in tomorrow's jobplace. There are many reasons to believe that traditional schools cannot convey the knowledge, strategies, motivations, and social interaction patterns required in the contemporary workplace and community. Not surprisingly, what is learned in school does not transfer to the workplace. (c) When effective learning programs are devised, they often are provided in settings that demand tuition that students cannot afford, or they require people to forfeit current income to

prepare for future employment, income that many simply cannot afford to bypass.

Even the successes in adult literacy education pose challenges. Adults are returning to school in larger numbers than ever before. This poses a challenge because many post-secondary institutions are geared toward the education of 18- to 25-year-olds: Support services that work well with young adults are completely mismatched to the needs of older adults. Critical classes, advisors, and extracurricular events are often scheduled at hours that mesh with the schedules of dormitory students more than working adults who are taking classes on a part-time basis. Certainly, it is encouraging that half of the adult population are engaging in some types of adult learning: The problem is that those already well educated, wealthy, and employed are more likely to better themselves through additional learning than are those who are low in literacy, poor, and under- or unemployed. Whites are more likely to engage in lifelong learning than blacks, so that lifelong learning opportunities have the potential to increase socioeconomic differences between the races rather than reduce them. Keith Stanovich, a prominent basic researcher in reading, often refers to the "Matthew effect" in literacy, with those relatively well off getting better off because they can and do read more (i. e., as both Matthew and Luke expressed it, "The rich get richer").

In summary, there is much to worry about with respect to adult literacy and learning. The NAEP has done a good job of letting the country know what young Americans, including young adults, cannot do. The statistics on dropouts and the low literate unemployables and underemployables are shocking, with some observers of adult literacy claiming that 1 in every 3 or 4 urban dwellers is illiterate or low literate. If it is bad for whites, it is worse for minorities. There is very good

reason to believe there is a crisis---a crisis that requires dramatic changes in direction. Our belief is that some important shifts in the literacy research efforts supported by the federal government could go far to stimulate the development of educational initiatives that would make a difference in the adult literacy and learning of the nation. The remainder of this document is dedicated to research directions that seem to us to be most likely to lead to essential understandings that could be used to redesign education so as to increase the literacy and learning competencies of American adults.

3. Goals of Literacy and Learning for Adults in the 1990s

As part of this effort, the federal government must provide support to redefine the meaning of educator success in adult literacy and learning. The federal government in recent years has placed too much emphasis on traditional outcome measures, including performances on traditional standardized tests. A new definition of the adult literate is essential to the design of adult literacy and learning programs.

Determining sensible goals for adult literacy/learning interventions. What is required in effective programs are goals that are sensible to both educational and business/industry leaders in the adult literacy and learning enterprise. A statement of goals and assessments of all of the following are critical as part of the development of adult literacy and learning programs:

- Communication skills: Ability to write clear descriptions and speak effectively to individuals (including co-workers), groups, and others separated in place and time from the writer (e. g., directions placed in a computer file for the next handler of the information to use). Expressing thoughts, feelings, and opinions persuasively in writing and

speaking are essential communications skills in effective organizations.

- Basic knowledge of math, science and technology: Understanding the significance and the importance of constructively adapting to changing technologies as well as learning how to apply fundamental ideas about biological and physical science to problems encountered in the community and on the job.
- Problem-solving skills: Knowing how to apply knowledge of science, math, and technology to real problems and knowing how to communicate with others about the solution of problems requiring sophisticated application of scientific, mathematical, and technological knowledge. Part of this is the ability to gather, analyze, interpret, and integrate information, producing syntheses of it that can be interpreted by many others.
- Intellectual teamwork: Knowing how to participate in a group to share information, negotiate understandings, and cooperate in solving problems. Real literacy requires being able to function as a teacher on some occasions and as a learner on others. Knowing how to resolve conflict as both a teacher and a learner is a high priority; knowing how to reflect with others to solve problems is absolutely essential given the many talents required to solve the complex problems that come up in many contemporary workplaces.
- Self-monitoring: Evaluating one's own work and actions, demonstrating initiative, and displaying honesty and

professionalism are essential. Monitoring one's personal habits and characteristics and cultivating behaviors and traits likely to lead to success are essential for people to maximize success in both the workplace and community.

- Social responsibility: Respecting and promoting a safe and attractive world, both in the short-term and long-term (e. g., understanding the impact of personal and employment-related decisions on the environment). Effective citizens appreciate the contributions of peoples from diverse backgrounds to the cultural richness of the country; they participate constructively in a democratic society (e. g., from voting to volunteering to provide needed services to nurturing social responsibility in family, co-workers, and neighbors).

Our strong view is that effective programs of instruction can promote all of these competencies and that OERI should play a role in stimulating the development and dissemination of programs that are effective in developing such diverse, yet critical, competencies in youth and adults. To do so, there must be development of appropriate measures of these competencies.

Evaluations of the demands of the workplace in 2010 aimed at stimulating immediate reform of elementary and secondary education. If elementary and secondary schools do not provide the literacy, numeracy, and technical skills demanded of the 21st Century, the country is doomed to a future of literacy lower than required by the potential economy, a potential economy that may not be realized because qualified personpower is not available to make it run. There need to be serious studies of what the demands will be in 2010, with an eye to identifying ways that schools

can do today to meet those demands. For example, it seems an almost certain bet that computer literacy will be a critical skill in 2010. As we consider this, we reflect on the many elementary classrooms we visit that have a single computer that is far from state of the art and that is almost never used. It seems likely to us that students who experienced 12 years of routine interaction with computers would be better prepared for the workplace of the 21st Century which demands routine interactions with computers that will students who visit the computer lab a few times a week or only take their occasional turn on the one classroom machine.

Thoughtful, convincing analyses of the skills and competencies that will be needed could go far in convincing politicians, communities, and businesses to invest resources in education that could assure that the current cohort of students is prepared to meet the economy of the future. Although many might view such futuristic research as probable pie-in-the-sky work, we view it as essential research that must produce concrete changes in educational resources and practices. A bonus of such shifts in instruction may very well be a curriculum that will seem more relevant to students, be more engaging, and thus have greater holding power. Students who may justifiably be turned off by computational exercises, may have greater enthusiasm if they are doing high-level problem solving on calculators and computers, relegating the low-level, tedious tasks to the chips in the powerful machines at their finger tips.

Another potential reaction to this futuristic perspective is that it is possible to wait until the current cohort of students is in high school and nearing 2005, with relevant experiences, coursework, etc. provided at that point. Cognitive psychology, however, has provided ample data that flexible internalization of complex competencies takes years to

accomplish. If we wait until today's kindergarten children are in high school, there is a very good chance that the several years of instruction that would be possible at that point would not lead to the habits of mind that are internalized competence. Just as years are required to move the adult low literate to high literacy, it will also take years for most people to become computer literate to the point that they can flexibly interact with machines and software in the complex contexts of community and workplace.

We are very keen on this particular direction because it is apparent that many higher-order skills can be introduced during the elementary years, skills that many believe will be important in the 21st Century. Thus, the thinking skills mentioned in Education Goal 5 as important to cultivate in higher education can now be cultivated in the grade-school years, with substantial validation of higher-order strategies instruction at the elementary and secondary levels in the last decade. At the same time, we note that the typical conservativism of many schools resist the teaching of such skills. If a very good case can be made that such skills are essential in the economy of the 21st Century, this might go far in convincing educators to revise obsolescent curricula in favor of curricula that anticipate the demands of tomorrow. Funding research that will make educators ever more aware of the future demands that will be put on their students seems like a very good idea.

4. Innovations That Integrate School and Work

In general, we believe that more Americans will achieve these competencies and dispositions only if there is a greater coordination of school, community, and workplace efforts. One overarching theme in our proposals is that new school curricula should be developed that are more relevant and thus, have more holding power. These curricula should

address concrete needs of students, demands that they actually face in settings that matter to them (i. e., community and workplace). The programs that are needed must be devised using school, community, and employer resources and be economically feasible and attractive for all participants---students, educators, and the greater community, including business and industry.

We propose that OERI should stimulate development of new programs that integrate schoolplace and workplace. The successful innovations could then be documented and disseminated nationwide. Consider the following bare-bones program as an example of the type of cooperation between education and business we view as desirable: Information management and accounting competencies could be taught in a combined high school and business program. Arithmetic foundations would be taught in high school, with workplace tasks incorporated into the high school curricula. Similar tasks would be encountered in the workplace setting that would afford an apprenticeship opportunity. Experienced members of the workplace would be appraised of what the student had learned in high school with specific opportunities designed into the apprenticeship that would build on the foundational skills developed in high school and make the relevancy of those foundational skills all the more apparent to the participants. In such a program, students receive work-related experiences at school and continue receiving school-related training at work. There is real integration. Along the way, there would be lessons in the type of problem-solving that real accountants encounter; students would be required to communicate about management matters with teachers, fellow students, co-workers, and in the abstract (e. g., preparation of financial reports); basic math skills would be practiced in a variety of ways; there would be experience with teamwork, for example,

working with others to prepare budget information needed by the boss tomorrow; self-monitoring would be essential for the successful completion of many tasks; students would experience first-hand the need for absolute honesty in transactions and great care in accounting for transactions; and students would be made aware of the real-world consequences of mismanagement, dishonest accounting, and irresponsible financial practices, with many of these lessons provided informally through the "war stories" of co-workers and both formally and informally through explanations of the reasons for particular management and accounting practices.

Theoretical bases of integration. One theoretical reason that we favor education in the work setting is that cognitive science has established in the last few decades the power of domain-specific knowledge. If the goal is to develop workers who can skillfully navigate their workplace ecology, there is little reason to believe that abstract and general skills will lead to as certain and efficient performance as concrete and specific skills acquired in the setting where performance is required. Although such skills may not transfer broadly, (i. e., a good problem solver working at a newspaper might not be a good problem solver in a chemical factory), when skills are learned in one context, they are likely to transfer to another context requiring similar demands (e. g., another newspaper for the student journalism apprentice or another chemical factory for the student chemical technologies apprentice). At a minimum, far less new learning will be required for the employee who has developed deep knowledge of a type of job in a different setting than would be required of a person starting without previous experience.

A second theoretical reason for favoring this approach is that it is likely to increase the alignment of motivations in schooling and

workplace. Traditionally, school-place motivations have been oriented to short-term assignments, individual achievement in a competitive atomosphere, avoidance of negative sanctions such as suspension, and for some fortunate students, positive motivation such as intrinsic satisfaction in learning new ideas. In contrast, the workplace requires (and rewards) the completion of complex tasks, group achievement in a cooperative atmosphere, attaining personal rewards such as salary increments, and the positive motivation associated with doing well a job that is important for society. Our belief is that school would be substantially more engaging for many students if at least some of the motivational tactics of the workplace were imported into the schoolhouse.

For example, although teamwork and cooperation are increasing in high schools, much more of it would be a good thing because of the real-world demand for team skills but also because there is substantial evidence of increased motivation in cooperative compared to competitive settings. More long-term projects would prepare students better for the time scale of demands in the workplace, but such projects should also be welcomed because of their pedagogical potential for promoting deep understanding of important ideas. What is really encouraging, however, is that there are curricula options emerging that permit multiple improvements in the motivational characteristics of school.

Learning in context. Consider the possibility of redesigning school so that groups of students are given some important problem to solve, a problem requiring integration of skills and knowledge (e. g., determining whether the lead content in the school's drinking water is anywhere near the danger level and making recommendations to assure that the school's water be lead-free in the future). Such a problem requires massive cooperation and coodination as students gather information, synthesize

knowledge, and communicate between themselves and to others about it. Basic knowledge of math, science, technology, and writing must all be applied to this task if each student in the group is to be able to write a final report effectively delineating the outcomes of the study. Monitoring of performance is absolutely required; without it, many important pieces of the puzzle will be overlooked. Such a problem can also provide important lessons in social responsibility, including weighing the benefits and costs of various alternatives that might be considered by a decision-making body (e. g., the costs of replacing the pipes in the school completely to eliminate a small risk versus living with the present pipes and the small risk). Our vision is that such problems that are realistically relevant to students would be a much better hook for remaining in school than a steady diet of math and chemistry assignments involving word problems referring to scenarios not likely to be encountered by students. Our vision is that such problems could definitely be worked out by schools and businesses in cooperation to develop a curriculum that would provide more natural bridges to the workplace than current curricula.

Lest readers doubt the existence of potential problem projects that bridge school and work demands and competencies, consider these examples: Determine a fair pricing policy for tickets to athletic events that raises the revenues required to pay for sports. Determine the complete costs of operating the school district's fleet of buses and identify policies that could reduce costs. (Much could be learned about math and management considerations from such problems.) Analyze the nutritional value of the foods served in the school cafeteria and determine whether such nutrition at lunch time is sufficient for all students, from those coming from environments that do not permit healthy breakfasts and

dinners to those who overeat at every meal. Develop cost-effective modifications for the school's doors that will make them easier to open and guarantee that they will fully close when released. (Such problems require knowledge of science applied to real-world problems.) Develop a voter registration drive that is equally likely to result in the registration of every class and group of voters in a community. (Multiple communications skills would be practiced, with a great deal of opportunity to reflect on the inequities of democratic participation of all in the community.) And, of course, every one of these problems links to work demands that various employers want in their settings, from the ability to solve mechanical problems to understanding of how to conduct an advertising campaign. And, of course, every one of these problems has high potential for grabbing students and getting them deeply involved in problems that can be really absorbing for adolescents---especially those contemplating careers in mechanics, management, and community relations and contact.

Support for the design and evaluation of new programs. Although there are already exemplary treatments out there, there are many yet to be invented, ones that might be invented given some startup resources. Once the demonstration project is up and running---and we would urge funding sufficient to allow several years of formative evaluation--- summative evaluations should be conducted. If the summative evaluation produces evidence of high impact, in-depth analyses of the treatment should be undertaken to provide the richest information possible for the nation about the operations of the program and its benefits.

In summary, what follows are specific ideas about how to support the design of new integrated learning opportunities. We see a range of institutions cooperating to increase the relevance of educational

opportunities in schooling environments. There are several strands of research required if excellent school- workplace integrations are to become common. Some of the possibilities can be fleshed out more than others because there is precedent work. We contend that dramatically innovative programs, and research on those programs, also is needed, however.

5. In-Depth Evaluations of Existing Effective and Ineffective Adult Literacy Programs

There are tales of success in adult literacy. For example, we know that some major corporations have done much to assist substantial proportions of their employees to improve literacy. Some smaller companies have succeeded as well. Some states have launched campaigns to improve the literacy of their residents as part of an overall package to increase their economic competitiveness for new industries, with states, such as South Carolina, making noteworthy gains in both adult literacy and economic development. There are tales of alternative high schools that win dropouts back to the classroom by providing instruction that makes sense to the students. In addition to these institutional efforts, there are individuals who have managed to improve their lot in life by seeking out and sticking with education. What is so frustrating to us as theorists and researchers who are interested in literacy is that, although there are anecdotes and case studies, we know so little about these successes!! We do not know enough to duplicate the best of adult literacy constructively in other settings. This is a tragic state of affairs, for the country needs more than an exemplary employment-setting program here or there and more than model high school programs that are the lucky convergence of gifted and dedicated teachers who manage somehow to get it right. One important route to making effective and appealing adult education

opportunities common is to understand the exceptional efforts of the day.

Studies of effective adult literacy programs. One of the most important directions in educational research in the last two decades was effective schools research. The goal of this research was to identify the characteristics of elementary and secondary schools that produced exceptional achievement (i. e., "outlier" schools), especially ones that did so in settings where other schools fail. There have always been schools in the middle of ghettoes that produce student bodies that are well above average no matter how they are measured. There have always been settings where students who could not succeed elsewhere succeeded there. The effective schools researchers generally relied on qualitative research methods to get at the basis for the quantitative (i. e., test score) successes of effective schools, often methods viewed with suspicion by quantitative researchers, such as interviews and case studies and ethnographies. What emerged from these efforts, however, was remarkable consistency. Good schools really did have some common characteristics that were revealed by these methods. Especially pertinent to Goal 5 are the characteristics of effective secondary schools, schools that succeed in keeping students in the classroom through grade 12:

- A shared sense of academic purpose by faculty, parents, and community
- Recognition of student accomplishments
- Recognition of good teaching
- High involvement by parents and community in school affairs
- A sense of caring and community (i. e., students care about school affairs and educators are committed to student welfare)

- Academic emphasis (and coursework) for all students
- Homework
- High expectations that students can learn
- Most class time is on-task (i. e., there is a great deal of instruction)
- School environment is orderly
- Discipline is fair-minded
- Strong leadership that actively recognizes problems in the school and seeks to solve them
- Teachers and administrators believing they are in control of the school and teaching
- Staff collegiality (Based on Newmann, 1991, p. 58, in J. R. Bliss, W. A. Firestone, & C. E. Richards, Editors, Rethinking effective schools: research and practice. Englewood Cliffs NJ: Prentice Hall.)

The worth of research-based information on effective educational settings is apparent in that many schools across the United States have paid attention to the effective schools research literature, with some estimates as high as 41% of U. S. schools being influenced to some degree by the effective schools movement (a 1989 General Accounting Office statistic). One very good reason for the federal government to fund the adult education equivalent of research on effective schools is that such information is very likely to have high impact for such information is credible in the eyes of educators, grounded in school practice and reported in terms that makes sense to educators. The theory is built from the ground up, with the result a theory that links to the experiences of education professionals more than do more abstract theories intended to stimulate deductive research.

A second reason to support such efforts is that grounded theoretical analyses and qualitative research methods are acceptable to many of the individuals who have traditionally identified with research on lifelong learning, something apparent from the preponderance of qualitative research in many adult literacy archival outlets, handbooks, etc. We believe that the scientists who have the greatest content expertise in adult literacy and learning would find appealing the opportunity to conduct across-site qualitative studies that were aimed at developing a theory of what works in adult education. Our familiarity with this community suggests there would be a great reluctance on its part to take up more quantitative research efforts. Although our own preference would be for eventual quantitative evaluations of interventions that were developed based on qualitative analyses of outstanding successes in adult education, for the present, we feel there is an urgent need for better theory about effective adult education efforts. Such theory seems most likely to be generated in a timely fashion using grounded theoretical analyses of existing, successful programs.

In making this recommendation, we are also struck as psychologists that the effective schools work focussed on institutional variables to the exclusion of psychological variables and that virtually all of the data in the Education Goal 5 document was non-psychological data. Because there is so much evidence that the failures of many adult education efforts to hold students are tied to decidedly psychological factors---boredom with the program, low self-esteem associated with attending basic education, perceptions of slow progress---we believe that qualitative analyses of effective adult education programs should do all possible to generate information about participant perceptions. Students committed to successful programs undoubtedly possess a great deal of information

about program appeals and aspects of literacy instruction that undermine student commitment. That knowledge needs to be tapped. Although introspective and interview data have often been considered suspect by many hard-nosed behavioral scientists, it is now well understood that the fastest and surest way to gain insights about decision making (e. g., deciding whether to stay with a literacy program or leave it) is to conduct intense interviews that are flexible enough in format to pursue potential leads offered by the respondent. For example, the most important tool for knowledge engineers developing expert systems is that interview of the expert. We think that interviews designed to be as exhaustive and flexible as the interviews used by knowledge engineers could provide invaluable data to the nation about why some programs work for students and others do not.

Detailed study of effective programs with minorities. No one could read Education Goal 5 without coming away with a sense of despair about minorities in this country. We believe that despair is unwarranted in the sense that the potential for minorities to participate more fully and to become better educated is very great. One of the clearest messages to emerge from cognitive psychology is that mental development and intellectual achievement are extremely plastic. Stimulating environments reliably increase the cognitive functioning of all people---young and old, mainstream and nonmainstream.

We believe that special efforts should be made to identify educational interventions that work well with minorities and to analyze these interventions as completely as possible. Once more is known about programs that work with minorities, it is essential to create a number of demonstrations of such programs working in diverse settings and to document the increases spawned by such programs. An important part of

evaluating the potential utility of such programs for the nation should be the extent to which the programs can be appealing and visible enough to stimulate commitment of community resources to them. We sincerely believe that overcoming the problems of illiteracy and resultant underemployment of minorities depends not just on educational treatments that improve reading and writing but rewards to participants for achieving in such programs. The rewards that count are jobs and additional opportunities in the community. Thus, it is essential to identify programs that are both effective in the sense of improving intellect but also effective in socializing minorities into the worlds of work and community. One way to make that happen is to make one measure of effectiveness the degree to which programs are supported by community and workplaces in the sense that community and workplaces mesh with the literacy programs to improve the quality of life and productivity of minority adults coming to literacy.

Well-grounded analyses of the benefits of adult literacy instruction to minorities could go a long way toward better informing the minority community of the potential of education and literacy to empower them. Minorities are justifiably dissatisfied with many American educational institutions that exclude them. Serious study and development of settings that foster minority achievement, with serious efforts to make clear to minorities the gains that await them if they choose to participate in such education, might go far toward decreasing the alienation of many minorities from education and the economy. Excellent studies documenting real gains that are meaningful to minorities (e. g., obtaining gainful employment in a good, private sector job with personal growth potential tied to personal efforts in increasing literacy and productivity) could be used to great advantage to the government in making clear to

the have-nots that there are access routes available to them. To the extent that such evaluations also stimulate businesses and industries to commit resources to efforts likely to produce educational improvement for minorities (and we think it is likely that businesses and industries would invest in educational interventions that are demonstrably effective), there would be additional tangible evidence of a nation making serious attempts to assimilate the now disadvantaged in ways that will improve both present and future generations. There is especially great potential here to make strong and visible statements to the minority community because minorities who do acquire education do exceptionally well in American society, with education much more rewarding for minorities than the mainstream population (e. g., increments in earning power due to additional education are greater for minorities than for mainstream citizens). If all minorities can come to believe that the gains now enjoyed by a few could be enjoyed by many more, there should be an increase in the motivation of minorities to seek out and stick with educational opportunities that can make a difference for them.

We are sensitive to the very great differences even within each minority group. Our view is that it would be perfectly sensible for there to be studies looking at populations varying in language proficiency, immigrant status, socioeconomic status, and mainstream acculturation. It also makes sense to look at types of programs, such as variations in minority experiences in different types of higher education settings. In doing so, we would also urge that such work needs to be done in such a fashion so that there is not unnecessary fragmentation. That is, there needs to be enough common methodologies across studies so that it might be possible someday to do the types of overview analyses that have been possible in the effective schools literature. If there are factors that

impinge on many minority groups similarly, the nation needs to know; if there are factors that vary with minority status, the nation needs to know as well. The only way the nation can know is by complementary studies and analyses.

In closing this subsection, we emphasize that descriptions of educationally disadvantaged immigrants do not dissuade us from the perspective that education and economic assimilation of large numbers of immigrants is possible. The descriptions on pages 9 and 10 of the Education Goals 5 document remind us of descriptions of immigrants and their educational attainments that were offered between 1885 and 1920. Those groups did well when offered opportunity. We expect that many of the current, disadvantaged minorities will do so as well, although more efforts may be required to offer educational and economic opportunities that are accessible to these groups---The complexity of many contemporary job places are daunting to many newcomers to the country and disadvantaged people in general; so are the complexities of many communities, so much so that educational opportunities that are available may not be known or may seem unapproachable. We expect analyses of adult education programs that are successful in moving minorities into schooling and subsequently into constructive community roles and economic roles can help to make education more attractive and approachable. In a sense, we are urging research to clarify for all the costs and benefits of adult literacy instruction. Our bet is that the benefits are enormous, and that research documenting these benefits can be disseminated in ways to make clear the advantages awaiting those who choose to seek out education and stick with it. Thus, such research has great potential for informing the nation about how the melting pot can continue, how people can arrive here with little in terms of resources and

education and make it in America.

Experimental comparisons. As part of the evaluation of successful programs and successful students, it should be possible to construct reasonable "quasi- experimental" comparisons. The really important features of successful programs may be especially obvious if their characteristics are compared with those of less successful programs and thus, there is a need for qualitative analyses of programs that are not working well. In addition, there is probably no better way to find out all of the ways that adult literacy and education programs can "turn off" students than to study adults who have left such programs or who resist entering them. Interviews of such students that are every bit as thorough as the interviews of the success cases should permit the identification of programs variables that foster adult commitment to education and those that undermine it. We believe as well that such work could go far in informing us about how to increase access to literacy instruction for adults, as well as about incentives for seeking education that are meaningful to adults.

In concluding this subsection, we emphasize that we believe there is a great deal of expertise "out there" about how effective adult literacy interventions works as well as about the differences between effective and ineffective programs. Getting at that expertise is going to require qualitative observations, analyses, and interviews of substantial numbers of successes and failures. Although the adult literacy researcher community is comfortable with qualitative analyses, they have not conducted the large-scale analyses that we have in mind nor have they always been as systematic and thorough as they could be. Moreover, although qualitative methods are intended to generate theory that subsequently can be tested, many qualitative researchers never get to the

test. Our intention is that those doing this work never lose sight of the need for eventual deductive tests in the form of controlled quasi- and true experiments, nor should they lose sight of the fact that their efforts will only be successful in the long-term if it is possible to use the evaluations to develop programs in new settings which have the characteristics of effective adult literacy interventions. In the immediate future, however, we believe it is time to build both theories of the independent (i. e., interventions) and the dependent (i. e., new assessments) variables.

6. Support for Programs Stimulating Development of Literacy in Both Parents and Children

There is enormous interest in the nation in approaches, such as the Comer Model, which stimulate the development of both parents and children. Teachers and administrators do what they can to invite parents to participate in the school. In some programs, explicit instruction is given to adults; in other, learning occurs incidentally during participation in the school culture (e. g., parents tutoring children can improve in their literacy competencies). In still other cases, such contact with school is a conduit for adults who have lived on the periphery entering the larger community; by doing so, they learn about educational opportunities available to them and those resources seem more approachable---School seems like less of a foreign institution than it once did. The tight connections between parents, children, and school contribute to the literacy development of both the parents and teachers; the benefit for the school is support from parents for its mission; the benefit for the parent is an increase in literacy, including an increase in ability to assist their own children to learn. That teachers, parents, and students participating in such schools seem to be motivated for school and have higher self-esteem than other schools serving comparable populations increases

enthusiasm for this approach.

We believe that an approach to adult literacy that has so many potential benefits for participants and the community deserves federal support. If OERI could encourage studies that documented the benefits and operations of model programs that simultaneously stimulate parent and child development, this could go far in promoting the dissemination of effective programs. Because these programs often can operate on low resources---indeed to the extent that they bring free help in the form of parent tutors and teaching aides to the schools, they are very low in cost---they seem especially important to us.

7. Studies of What Communities and Businesses/Industries Want and Are Willing to Support

Part of the federal research agenda on adult literacy should be to determine what communities and workplaces want from and expect of adult literacy instruction---just what does it take to induce communities and employers to become partners in adult literacy efforts, efforts that are carried out in communities, schools, and at job sites? Such research should make clear the benefits and costs of adult literacy efforts. If such research is conducted from the ground up in communities and employment settings, the result should be a body of theory and research that is meaningful to community and industrial leaders. It will be in familiar terms, rather than in the somewhat remote and often abstract terms used in many economic, sociological, and psychological analyses. The government should support the development of theory that makes horse sense to community and business leaders, who must be convinced that adult education and literacy deserves support at many different levels.

8. Studies of the General Value of Workplace Literacy Programs

An important empirical question is to determine whether literacy

acquired in domains such as the workplace has more general value. Such work seems critical to us because some prominent adult education researchers, particularly those who have a clear anti-capitalist perspective, have attempted to make the case that workplace programs are exploitative of workers rather than empowering. If that charge is true, it is a serious one that should be exposed; if it is not true, such a charge needs to be laid to rest for it has potential for reducing the likelihood that many who might provide resources for workplace programs will do so. There has been rhetoric on both sides of the workplace literacy issue, from those who see exploitation and those who envision a more literate workforce that is generally better off. It is time for some hard data on this issue. Some well conducted grounded theoretical analyses could go a long way to increasing our understanding of the potential impacts of workplace programs, impacts that then could be assessed in more formal, quantitative assessments.

9. Life-Span Analyses of Effective Literacy Interventions

Adults who would benefit from education are varied in many ways. One obvious distinction is age, with many recent high school dropouts in need of additional schooling and many retirees seeking education both for personal pleasure and possible additional contributions to community and economy. One of the most active areas of basic research in developmental psychology have been studies of life-span cognition. Although this research supports the case of life-long plasticity and sensitivity to instruction. There are clear differences in younger and older learners. Younger learners are quicker; older learners know much more based on their experience (in M. Pressley & C. B. McCormick, in press, Tutorials in Educational Psychology, Chapter 14. New York: HarperCollins). Younger learners are ready to try new strategies, especially if gains in competency

are produced by the strategies; older learners are more reluctant to abandon methods that have served them well enough in favor of new strategies that may require great effort on their part to acquire and use (see Chapter 3 in Tutorials in Educational Psychology).

Special efforts are required during the study of what works to determine what works at different points in the adult life span. We suspect that life-span analyses could be among the most dynamic of the analyses proposed here, with it likely that the perceptions of younger and older adults will be very different as will the objective benefits younger and older adults receive from participating in adult education. It would not be surprising at all if the career and education paths of adults differ depending on their age of participation in both formal and informal adult education. Because there is a research community already committed to the study of adult development, we think it likely that exceptionally well qualified scientists might be willing to take on life-span studies of adult education, with the very real possibility that both understanding of life-span education would increase as would our understanding of how adults function in a world with changing literacy and accompanying economic demands.

10. Motivational Analyses of Effective Programs and Analyses About How to Make Adult Literacy Programs Ever More Motivating

The adult literacy literature is filled with examples of people trying adult education and leaving it because they are not motivated sufficiently by the instruction. This is hardly surprising, for much of education is not motivating. Elementary students remain in school because of the force of law; many high school students are so unmotivated by school that they depart on turning 16. Adults rarely can be forced to attend school using

the mechanisms that hold youth in school buildings.

Elementary and secondary education researchers have recognized that motivation in school is not what it could and should be. One result has been a surge in research on how to make schools more motivating, with many important understandings arising from this work. For example, the value of cooperative over competitive environments is increasingly understood in the 1990s. How student interests can be used to support instruction is an important research and practice concern. Effective methods of praise and classroom management have been identified and are being put into practice. In short, educators are learning how to make classrooms more engaging.

We believe that those who have so increased our understanding of motivational determination of elementary and secondary achievement should not be charged to analyze adult instruction. A first order of business might be to develop an understanding of the characteristics of adult education and literacy that undermine motivation; a second goal should be to determine how adult education and literacy instruction can be re-engineered so as to incorporate elements that support engagement and commitment to literacy instruction and literate participation in the family, community, and employment setting. Improving the motivation of adults to be lifelong learners should be a high priority.

11. Studies of Dropping Out of School and Staying In

We do not understand well at all why people drop out of high school and leave college without completing degrees. We urge systematic study of dropouts to determine why they leave education and to identify factors that keep students in school. Once armed with such knowledge, the government should encourage research on how to change educational institutions so that they are more likely to retain students. We suspect

that if the insights from this research are used in the design of programs like the ones envisioned earlier, that it is likely that exceptionally attractive and effective programs with real holding power will emerge.

12. Studies of Apprenticeship

Stimulated in part by Lev Vygotsky's theory that cognitive competence develops in social interactions, contemporary reading and writing instruction in elementary and second schools involves students working as apprentices with accomplished readers and writers (i. e., their parents, teachers, older siblings, etc.). This same idea is prominent in the professional-development literature (e. g., in the writing of Donald Schön). Many, many scholars are attracted to it. We suspect that many workplaces are also attracted to it.

A great deal might be learned about how apprenticeships can increase both literacy and job skills by stimulating the creation and evaluation of adult literacy programs that require the apprentice to be improving reading and writing while learning other work-related skills. Our view is that if the government takes this tactic, they should urge work that will have a long period of formative evaluation, including a great deal of qualitative evaluation, so that those who would try apprenticeship literacy education would have a chance to "get it right" before facing a summative evaluation. Consistent with our perspective throughout this document, the qualitative, formative evaluation would be expected to inform the summative evaluation with respect to relevant dependent measures. We are particularly enthused about this alternative because it seems to be one of the most likely ways to bridge the gap between classroom and workplace.

13. Affordability

Many Americans have gone to college on scholarships and with the

assistance of various types of financial aid. Post-secondary education costs have skyrocketed in the last decade, making such aid ever more necessary. Our view is that it is essential that extensive research be conducted to determine how to make high quality education affordable to those most in need of it. Again, rather than starting with old presuppositions, we encourage new and well-grounded work aimed at assessing in a detailed way the perceptions and resources of students, educational institutions, communities, and businesses.

14. Effects of Delaying Education

We are struck by the large proportion of students who now defer higher education. It seems to us that the collective impact of these individual decisions may be massive. It also seems to us that a first step in deciding such impact is to do extensive work determining exactly what people do with their time between high school and future schooling. If they take low-level employment, the verdict on waiting goes one way; if they engage in employment and activities that helps them decide what they really want to do and prepares them for additional education, another verdict is reached. There need to be studies of how 18-22-year-olds use resources in college compared to adults who return to school. There need to be studies of the life successes and failures of current 40-, 50-, and 60-year-olds who took their higher education at different points in life. Are the career accomplishments of 60-year-olds who started college at age 35 demonstrably lower than the career accomplishments of 60-year-olds who began college at 18 and completed four years later. If they are, then there is reason to urge research to determine factors that will encourage early post-secondary enrollment; if there are no differences in overall outcome, then worrying about early enrollment seems less compelling.

15. Overcoming Adult Learning Disabilities

Efforts to bridge brain science and education. There have already been dramatic new understandings about the neurological bases of learning disabilities in this "Decade of the Brain." The implications of this work for education need to be worked out, with little communication between educationally oriented researchers and neuropsychologists and brain scientists at present. In particular, there need to be studies in which brain scientists and more traditional educational researchers collaborate to evaluate the effects of various interventions on brain functioning and the dependency of various interventions on neurological structures and functions.

Identification and analyses of new technologies that compensate for learning disabilities. There are many new products that might compensate for some forms of learning disabilities, from the simple such as calculators to robots rich in artificial intelligence. There needs to be serious research efforts into how such technology can be disseminated to and used by the learning disabled so as to normalize their lives and maximize their productivity and happiness.

16. Re-Education of Educators/Identification of New Educators and Trainers

Many educators do not know how to teach adults; many do not know how to incorporate curricula that would meet 21st Century demands. We are convinced that massive efforts must be made to develop educator re-education. At the heart of such re-education should be an emphasis on preparing students for the future, with this preparation viewed as a partnership between schools, families, communities, and business. A message in Education Goal 5 is that school should not be separated from the workplace and community as much as it has been traditionally. A great

deal of re-education will be required, as will a great deal of rethinking about the wisdom of only permitting those with traditional teacher education to teach in schools. As meshing of community, business, and educational enterprises continues, it will become apparent that licensure restrictions are often artificial and unacceptable boundaries on the teaching competencies needed in educational settings that address the educational needs of the next century. Fortunately, many post-secondary institutions have already lifted such restrictions (or never had them). We believe an important futuristic research direction is to begin to explore the ramifications of letting many more competent citizens teach the next generation. Study of demonstration sites that integrate traditionally-prepared teachers and teachers who have other training and expertise seems like a very good idea. We suspect that such learning communities might be very dynamic, with many consequences that we can not anticipate. We also believe that many who are already empowered might choose to teach in such settings on a part time basis, which would provide them with additional insights about the needs of low literates and adult learners and might also bring many fresh solutions to the problem. For example, how many successful businessmen who might teach literacy skills part-time would also look for ways to help their students beyond the classroom?: Educational settings can be a mechanism for increasing contact and informal commitments between the currently advantaged and the now disadvantaged. We believe that if advantaged people with great competency can be encouraged to teach even part-time, there is a very good chance that these advantaged individuals would find ways to increase their support of those struggling to make it---One of the clearest messages from social psychology is that contact between groups who otherwise avoid each other decreases prejudice and increases human

responsivity to the other group. These are outcomes that great adult education efforts would promote, permitting tens of thousands of Americans to be "points of light."

STRENGTHENING CONNECTIONS BETWEEN LEARNING AND WORK

A Proposed Five-Year Research Agenda for the Office of Educational Research and Improvement in Pursuit of Goal 5: Adult Literacy for Global Economic Competition and Citizenship

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STRENGTHENING CONNECTIONS BETWEEN LEARNING AND WORK

Toward an Educational Economy

Education and work increasingly happen at the same time. Most U.S. students hold paid jobs while attending high school or college. More people at work, up and down the line, are participating in formal and informal education and training on the job or connected with their jobs. Throughout the industrialized world large and small enterprises struggle to become learning organizations because they recognize that profitability and market share are achieved by quick adaptation to fast-changing product demand, technology, and market conditions. National economic competitiveness, survival and growth of firms, and the ability of individuals to find fulfilling work all depend increasingly on the efficient pursuit of learning and production at the same time.

The first two objectives enunciated under Goal 5 at the 1989 education summit would accelerate this convergence of education and work. The first objective calls for more extensive interchanges between schools and workplaces: "Every major American business will be involved in strengthening the connection between education and work." Among other things, this could imply, specifically, that larger numbers of school teachers and students spend some of their time producing goods and services in business firms, while more employees from those firms spend time as teachers or students in schools. Furthermore, each individual's activities as student, producer, and teacher should be related and sequenced so that one activity reinforces the other. Learning enhances productivity, while productive activity forms a context for learning and teaching.

In addition to more frequent, intense, and long-lasting interchanges between schools and firms, a society in which learning and production are more closely interwoven would include more hybrid organizations that perform the functions of both education and work. Companies engaged in learning-intensive methods of production may expand their human resource development activities not only to offer wider and deeper education and training for existing employees, but also to provide formal schooling -- including Associate degrees, Bachelor's degrees, and high school diplomas -- for employees-in-training (apprentices), for the daughters and sons of existing employees, and for the community at large. As firms seek ever more efficient methods to build learning into production, they become models for schools. For their part, the

schools may become more active in conducting applied research and development, experimenting with alternative methods of production and becoming, in some instances, model workplaces.

This kind of institutional evolution is implicit in the second objective under Goal 5: "All workers will have the opportunity to acquire the knowledge and skills, from basic to highly technical, needed to adapt to emerging new technologies, work methods, and markets through public and private educational, vocational, technical, workplace, or other programs." Such widespread learning by workers is not likely to occur if educational institutions remain exclusively dedicated to teaching academic or vocational subject matter detached from a practical context, and if most businesses continue to treat labor as a cost to be minimized rather than an asset to be cultivated. Creating opportunities for "all workers" to learn the whole range of work-related knowledge and skill requires nothing less than an educational economy in which productive activity propels more widespread human development, where work itself is driven less by insecurity and more by human curiosity.

Agenda for Research

The research agenda can be broken down into three main issues: (1) how to support growing interchanges between schools and firms that promote transition from school to work; (2) how to encourage the evolution of firms into learning and teaching organizations, (3) how to use schools as model workplaces.

Growing Interchanges between Schools and Firms

Currently there is a great deal of interest in creating work opportunities for students that are closely linked to their education in some kind of "youth apprenticeship" (William T. Grant Foundation, 1991). Arkansas, Oregon, and Pennsylvania have initiated pilot programs. The Council of Great Lakes Governors is coordinating efforts in eight midwestern states. Jobs for the Future (JFF), a nonprofit group in Somerville, Massachusetts, is conducting demonstrations and providing technical support for new apprenticeship-like programs. The U.S. Department of Labor, through its Office of Work-Based Learning, is also supporting demonstrations. The Council of Chief State

School Officers has awarded grants to six states to begin designing youth apprenticeship systems. Several of these initiatives include research or evaluation components. Other research is also under way on various aspects of school-to-work transition, including one OERI center dedicated to understanding what improving school-to-work transition implies for school reform. The most definitive data on prevalence of new apprenticeship programs will be available from a national survey conducted for the National Assessment of Vocational Education (NAVE) in spring, 1992.

The NAVE survey will also measure the prevalence of cooperative vocational education and other school-supervised work experience programs (both connected and not connected to students' vocational coursework). Before leaving high school, most students in the U.S. will have held a paid job at some time during the school year -- but the great majority of these employment experiences have no connection to students' schoolwork (Lewin-Epstein, 1981; U.S. General Accounting Office, 1991). Questions have been raised about the benefits of working in the kinds of jobs which are usually available to high school students. Most notably, Greenberger and Steinberg (1986) have described students' jobs as largely repetitive and unchallenging, offering students little contact with adult co-workers. In their sample from Orange County, California, Greenberger and Steinberg found that students who work longer hours spent slightly less time on homework and received slightly lower grades. Similarly, Mortimer and Finch (1986) found that boys who spent more time working while in high school had lower grades, lower estimates of their academic abilities, lower educational and occupational aspirations, and had completed less additional schooling in the first five years after high school. D'Amico (1984) also found some negative correlations of work experience with study time and high school completion, though only for students who worked more than 20 hours a week. Such evidence does not prove that working undermines commitment to school -- it is quite possible that the students who work, or who work longer hours, do so because they are already disenchanted with school -- but there is nevertheless ground for concern. (A more complete review of research on the effects of students' work experience is in Stern, McMillion, Hopkins, and Stone, 1990.) This concern has recently prompted some states and school districts to tighten restrictions on students' working hours (Graves, 1992).

An alternative to restricting students' work would be to make it an educational experience. Cooperative education, youth apprenticeship, and other forms of structured, work-based learning are intended to use students' work as an opportunity to apply and

extend what they are learning in school. There is ample evidence that students in school-supervised jobs do, in fact, see a closer connection between work and school (Leske and Persico, 1984; Stone, Stern, Hopkins, and McMillion, 1990; Stern, Stone, Hopkins, McMillion, and Cagampang, forthcoming). Possibly, school supervision could be extended to cover a larger proportion of jobs held by working students.

In addition to linking students' work more closely to school, there are also growing efforts to improve the school-to-work transition by altering the schools' own curriculum, especially in high schools and two-year colleges. The Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 mandated that basic federal aid for vocational education be spent on programs that "integrate academic and vocational education." An example of this approach is the career academy (Stern, Raby, and Dayton,1992). Career academies are schools-within-high-schools that integrate the curriculum around a career theme. They also usually offer students related work experience through paid jobs during the summer or part-time during the year. The National Academy Foundation, sponsored by American Express Company, is the largest network, with programs in more than 20 states. California has its own network of approximately 50 state-funded programs. Philadelphia has been developing academies since the late 1960s, and other cities, including Washington, D.C., are also adopting the academy model.

A key feature of career academies is that they keep open students' option to attend postsecondary education. Unlike traditional vocational education, which since the 1917 Smith-Hughes Act has focused on preparing students for occupations not ordinarily requiring a baccalaureate or advanced degree, academies prepare students for career paths that may well lead to four-year college and beyond. Part of the rationale for integrating academic and vocational education is precisely to avoid dividing high school students into college-bound and non-college-bound tracks. The idea of high school vocational studies leading to postsecondary education is explicit in the "tech-prep" model promoted by the 1990 Perkins Act. Tech-prep programs formally combine at least the last two years of high school with at least the first two years of college in a planned program of study.

Questions for research. Youth apprenticeship, cooperative education, career academies and tech-prep are examples of programs that use students' work for educational purposes and to some extent also change the curriculum within schools.

Research on these programs should attempt to discover what works, why it works, and what obstacles impede effective practice.

Discovering what works must begin by recognizing that each program embodies a number of specific components. For instance, cooperative education usually includes a written training plan for each student, detailing what the student is expected to learn on the job. However, some cooperative education programs may not use written training plans, while some youth apprenticeship programs may. Because these programs are complex, it is important that any evaluative research start by describing exactly what the treatment consists of. Some of the treatment dimensions on which programs can be compared are (see National Child Labor Committee, 1984; Hamilton, Hamilton, and Wood, 1991; Jobs for the Future, 1991):

- Age or grade level at which treatment begins. Some programs nominally start in ninth grade, for example, but also provide preliminary preparation for younger students.
- Criteria for defining eligible students: for instance, at risk, non-college-bound, or broad cross-section.
- Whether students choose to participate or are assigned.
- If students choose to participate, whether parents are required to be involved in the decision.
- Degree to which the school curriculum integrates academic and vocational subject matter. There is a whole range of approaches here (see Grubb, Davis, Lum, Plihal, and Morgaine, 1990). For instance, an occupational theme may simply be infused into academic courses, students may be engaged in projects that bridge academic and vocational subjects, or the scope of such projects may grow to the point where the distinction between courses fades away.
- Whether counseling is included: personal, college advising, or career planning.
- If related work experience is part of the program, how much time it takes and at what hours; whether it is paid; whether students receive course credit and, if so, how much; and how closely the content of the work is related to what students are intended to learn in school.
- How school supervision of students' work experience is structured. This includes whether the supervisor is a teacher in a vocational or academic class. If there is a written training plan, who signs it and what are the contents. Whether job placements are found by the student or teacher. Frequency of visits to the job site by the school

supervisor, and whether written reports are filed. Whether students have opportunities to reflect on and criticize their experience at work: individually or in groups, orally or in writing.

- Extent and nature of staff development for participating teachers.
- Employers' responsibility for students' work experience. This includes assignment of staff to perform as training coordinators, coaches, and mentors. It also includes specifying learning objectives, providing a sequence of increasingly responsible assignments geared to those objectives, helping to evaluate students, and providing feedback to the school.
- Employers' involvement in the school's program: helping to design the curriculum, specifying objectives, providing speakers, inviting students for field trips, providing internships for teachers at the work site, and donating materials, equipment, or money.
- Linkage with postsecondary education through course credit arrangements and planned course sequences.
- Whether students' continued participation in the program depends on meeting certain performance standards, for example attendance or grades.
- Role in program governance of teachers, employers, parents, students, and post-secondary educational institutions.
- Expected outcomes for participants, including occupational certification and advancement to post-secondary education.

Research strategy. Given the large number of treatment dimensions, evaluation of what works would require a planned-variation approach. Certain programs should be chosen based on particular configurations of treatment. For instance, one program might have a well-structured work-based learning component, another might have a highly integrated academic and vocational curriculum, a third program might include both of these, and a fourth might have these plus a well-articulated link to post-secondary education. All four programs should serve a similar population of students. Students should be randomly assigned to treatment and control groups, but with great care to minmize the possible disappointment of the latter (unlike medical research, educational evaluations cannot offer a placebo). Outcomes should include standard measures of performance in school, participation in post-secondary education, and success in the labor market.

What is called for here is a large-scale, longitudinal study, lasting at least five years. The design and execution should probably be done under contract with OERI. The Manpower Demonstration Research Corporation is currently proposing an experimental evaluation of career academies; if that study goes forward, OERI's research might be coordinated with it.

In order to discover why various program components are related to positive outcomes for students, it is necessary to study the nature of participants' experience and its connection to their other roles and activities. This can be done with small-scale, quasi-ethnographic studies similar to that of Stasz, McArthur, Lewis, and Ramsay (1990). What do students do at work, exactly? What kinds of skill and knowledge are they developing? (U.S. Department of Labor, 1991) Are they engaged in "legitimate peripheral participation," as Lave and Wenger (1991) define it? In addition to what students are getting out of the experience, it is also important to discover how the presence of students affects existing employees in the host firms. Do they spend their time differently? How deeply are they involved in what students are learning? Does the presence of students at the work site make the learning agenda more explicit for other employees?

Small-scale studies can also be done to discover the obstacles to such programs. Interviews with participants would reveal what extra efforts they had to make, what problems they had to solve, and what opposition they had to overcome. This would help suggest state and federal strategies to support widespread replication of these programs.

One particular obstacle that has already become apparent may be especially critical to study. As high school programs begin to make greater use of work-based learning and integrated curriculum, they run the risk that students will not satisfy certain course requirements for admission to college, especially four-year college. Despite the putative advantages of work-based learning for acquiring knowledge and learning how to think (Resnick, 1987a,b; Raizen, 1989), some colleges still have no way to judge what students have learned except by looking at grades in certain courses. OERI should commission a study of this issue, and, if this is a serious problem, should look into alternative methods of assessing students' qualifications for higher education.

Evolution of Firms into Learning and Teaching Organizations

In the past decade an outpouring of books and articles, both popular and scholarly, has heralded the coming of new ways to organize work, and urged American companies to embrace them (among these are Walton, 1980; Reich, 1983; Piore and Sabel, 1984; Hirschhorn, 1984; Kochan, Katz, and McKersie, 1986; Walton, 1987; Zuboff, 1988; Dertouzos, Lester, and Solow, 1989; National Center on Education and the Economy, 1990; U.S. Congress Office of Technology Assessment, 1990; Marshall and Tucker, 1992). The argument by now is well known: a faster pace of change in technology, market conditions, and new product development requires firms to adapt more quickly, and keep adapting. This has two major implications for education. First, the amount of continual learning by workers must increase. Second, the quick pace of change, and the intimate connection with new products and processes, implies that much of this learning must occur in the workplace itself or in close proximity to it. The learning organization must become the site for an increasing share of adult education.

Should publicly funded research be involved in this? Shouldn't market incentives lead firms to provide the right amount of learning opportunities for employees, and the right amount of research on how to do it? This question does not arise in discussion of schools, because public schools are not governed by market forces. But business firms do respond to market forces, and so it is necessary to ask why these forces do not induce employers to do what is efficient.

According to a theory first propounded by economists Jacob Mincer (1962) and Gary Becker (1964), firms should indeed provide the right amount of education and training. In response to the old objection that companies lose the value of their investment when employees leave, Becker argued that firms must therefore require employees to pay for their own training if such training makes them more valuable to other employers. According to this theory, employees should pay for their own education and training by accepting lower wages or salaries while they are being trained. In effect, this proposed arrangement is an implicit apprenticeship. Although Becker's theory has been widely accepted by economists, it has not been directly tested until recently, when several surveys have produced data on training and earnings. Analysis of this data has failed to find any reduction in earnings for employees who are receiving more training at work (some of this evidence is reviewed in Stern and Ritzen, 1991). This lack of empirical support for Becker's theory raises again the question whether employers might

underinvest in employees' education and training because they fear they will lose their investment when the employees leave.

In addition, there are other reasons why markets are likely to fail. Even if employees could be induced to pay for their own education or training on a current basis, some investments in human resources still require financing. For instance, during business downturns, employees have idle time that could be used for education and training, but the firm lacks cash flow to support the payroll. Borrowing money to pay for education or training during the downturn could finance investment that would be repaid during the recovery. Financing is also necessary to cover the loss in production that occurs when an organization retools itself from a traditional to a learning-intensive mode of operation. The problem is that, unlike investments in plant and equipment, loans to finance investment in education or training cannot be collateralized, and lending institutions therefore do not make them.

The macroeconomic environment also affects firms' choice of strategies. When unemployment is chronically high, it is cheaper for employers to hire people on the external market than to train them in the firm. But when all firms adopt this strategy, the eventual result is a shortage of skilled people. Macroeconomic policies that keep unemployment low are necessary for a high-skill equilibrium (Soskice, 1989; Streeck, 1989; Levine and Tyson, 1990).

Questions for research. In this context, the first question for research is whether employers really do underinvest in education and training. Is there evidence that firms are missing opportunities for profit by not creating enough learning opportunities for employees?

If there is systematic market failure so that firms have too little incentive to invest in education or training, then there would also be too little investment in research on how to conduct education or training in the workplace. Practices such as skill-based pay (U.S. Department of Labor, 1988), embedded training (Office of Technology Assessment, 1990), or "doing by learning" (Stern, 1992) may be insufficiently developed. Moreover, since techniques for education and training cannot be patented, firms that do discover effective practices are not inclined to share them. Publicly supported research has a role in developing these practices and making them known.

A third reason for public research into firm-based education and training is that firms' activities in this area intersect with other matters of public concern. For instance, the content of skill-based pay systems within firms is relevant to industry-wide skill standards which are currently being developed under the auspices of the U.S. Departments of Education and Labor. Also, the adoption of learning-intensive production methods within a firm may increase the firm's likelihood of participation in cooperative education, youth apprenticeship, or other school-to-work transition programs.

Research strategy. These questions imply three kinds of study. One would investigate the profitability of a learning-intensive production strategy. Given two (or more) firms in the same industry, with a similar product mix and facing the same market conditions, does the firm that chooses a learning-intensive strategy really increase its profitability and market share? Part of that study should focus at the level of the work group rather than the whole firm, to document the linkage (or lack of it) between the content of what workers learn and improvement in their performance (productivity or quality of output). This research would test -- under given macroeconomic conditions -- whether firms are missing opportunities for profitable investment in education or training.

A second set of studies would examine particular practices used in learning-intensive workplaces. These include skill-based pay, embedded training, and doing by learning. Skill-based pay ties workers' compensation to what they know, rather than to the job to which they are assigned during the pay period. Increments in pay are awarded for demonstrated mastery of practical tasks and theoretical knowledge related to the workplace -- for example, how to operate a particular piece of equipment, or how to perform a certain accounting procedure. Skill-based pay directly rewards employees for learning on the job and motivates cross-training. Embedded training creates opportunities for learning through the work process itself. A "help" menu on a computer screen is one example. The result is just-in-time learning, analogous to just-in-time inventory control. Instead of trying to stockpile information in individuals' heads just in case it is ever needed, just-in-time learning or embedded training makes the information available exactly when and where it is needed. This is more efficient because it avoids teaching unnecessary information, and it prevents information from being forgotten between the time it is learned and the time it is used. While embedded training uses the work process itself as the setting for education, doing by learning is a technique for putting formal classroom instruction to immediately productive use, by using problems taken from the participants' work process as the subject matter. Quality circles are an

example. These techniques are widely used, but they are far from universal. Also, some of them have not been subject to much analysis. Intensive, analytical case studies would help make these practices better known and understand how they work.

The third set of studies would consider the relationship between learning-intensive practices in firms and the school system, both K-12 and post-secondary. One issue here is whether the existence of learning-intensive practices in a firm make it more likely to want to participate in new youth apprenticeship programs. On the one hand, it seems plausible that companies which practice learning-intensive production would also be more likely to provide high quality work experiences for students, since teaching and learning are part of their corporate culture. On the other hand, such firms also tend to provide a greater degree of employment security, so they should have less turnover and therefore may be less interested in apprenticeships. The issue here may be quality versus quantity: high-turnover firms might like to have a lot of student trainees on hand, but learning-intensive firms might offer much better opportunities to a smaller number of students. A four-way comparative study of firms that do and do not practice learning-intensive production, and that do and do not participate in school-to-work transition partnerships with schools, would help resolve this question.

Another study in this third area would consider the relationship among skill definitions embodied in firms' internal skill-based pay systems, in industry-wide standards, and in vocational education programs. Some consistency in these definitions would be desirable. A focused case study could discover whether there is a serious problem here.

Use of School Enterprises as Model Workplaces

School enterprises -- defined here as school-sponsored activities that engage groups of students in producing goods or services for sale or use to people other than the students involved -- have been a standard feature of many professional and vocational programs in graduate schools, two-year colleges, and high schools. At the graduate level, students operate research laboratories and produce law review journals. In high schools and two-year colleges, students build houses, run restaurants, staff child care centers, repair cars and appliances, and operate radio stations, among other things. These activities are often tied to vocational courses, but only seldom have they been connected to academic courses. Foxfire is the most conspicuous example of an enterprise (publishing) that arose from an academic (English) class (Wigginton, 1986). School enterprise generally plays only a marginal role in the lives of most students in high schools and two-year colleges, despite the potentially significant educational benefits of making productive work a bigger part of students' activity.

If properly organized, productive activity can contribute to schools' educational effectiveness. The educational benefit of combining education with actual production has been suggested by recent research on the value of "situated learning" (Resnick, 1987a, 1987b; Brown, Collins, and Duguid, 1989; Raizen, 1989; Sticht, 1979, 1987; Lave and Wenger, 1991). This research has produced new evidence that learning through the work process itself is an effective method for acquiring work-related knowledge. In contrast, what is learned in classrooms, while useful in classrooms, does not always transfer to actual work situations. A number of empirical studies have now demonstrated the lack of correlation between school-taught knowledge on the one hand, and problem-solving in the context of actual production on the other. These studies corroborate the value of learning by doing. In economic terms, they imply that productive activity can be a substitute for classroom instruction. Lave and Wenger go so far as to define learning as "legitimate peripheral participation in communities of practice" (p. 31). School enterprises are natural settings for learning in this sense.

Apprenticeship, cooperative education, and professional internship all appear to use work experience to complement classroom instruction, not to substitute for it. Students are evidently presumed to learn more from the combination of classroom instruction and work experience than they would from either one alone. The work experience gives students an opportunity to apply, extend, and better understand what

they have been taught in the classroom. It also confronts them with real problems that can motivate them to seek the knowledge their courses are offering.

School enterprise may offer more of these educational benefits than work experience in jobs outside the school. The supply of outside job placements depends on the business cycle and the prosperity of local employers. Thus, for instance, work opportunities on a school farm, restaurant, or automobile repair shop may be more predictable than in similar enterprises outside the school. School enterprises can provide instructive employment even if they do not make money.

Teachers also have more control over the content of students' activities in a school enterprise than in outside jobs. There is less danger in a school enterprise that students will be confined to simple, repetitive tasks with little educational value, or that they will be asked to sacrifice quality for speed. Since they are not required to make a profit, school enterprises can afford to let students work slowly and carefully, try out a number of different jobs, and take more collective responsibility for managing the operation (Stern, 1984).

Use of productive activity as a context for education may be especially effective in preparing students for learning-intensive production. Some advanced forms of school enterprise embody elements of the "learning enterprise" which may grow more predominant as basic and applied research, product development, and continual process improvement become more important parts of work for more people. This kind of education gives students practice in learning through work.

The fact that school enterprises exist for educational purposes means that they have more freedom than ordinary firms to explore the educational possibilities of work. It would therefore be of some interest to find out what school enterprises have discovered about how to use work to promote learning.

Research strategy. Descriptive case studies are called for here. The research should first identify school enterprises which have purposefully explored how to organize productive activities to maximize learning, and which have gathered measures of students' learning in the process. The main task would then be to describe what has been tried and how it has worked. The aim would be to draw lessons for non-school enterprises.

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Outline of a Research Agenda for
National Education Goal 5
Objectives 1 and 2

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This report discusses research agendas relevant to Objectives One and Two of National Education Goal #5. That goal states that "By the year 2000 every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship." I will discuss the two objectives separately, first outlining what I see as the central issues in the area and then discussing the research priorities.

Objective One: "Every American business will be involved in strengthening the connection between education and work."

Certainly strengthening the connection between school and work (and between school and other non-school activities) is a crucial objective, although I am not sure that it is necessary or even desirable to involve every business. Many people agree that schools could do a better job of preparing their students for non-school activities (including work) and that the educational content and experience to which students are exposed could be better connected to the world outside the classroom. From this perspective a central issue concerns the role that businesses, as businesses (rather than as employers of individuals who may

participate in the broader political process) can or should play in the process of connecting schools to the outside world?

But regardless of the optimal role for business in the abstract, any serious reform of the business/school relationship must confront the problem of the incentives that employers have to participate. Of course as employers of individuals educated in the schools, businesses have an interest in improving education, but individual employers have virtually no business-related incentive to devote resources to improving even their local schools. It is safe to say that, perhaps with the exception of businesses in isolated areas or businesses that are the dominant employer in a particular area, it is much more cost effective to devote resources to recruitment and employee selection (or perhaps to efforts to reduce the need for particular skills) than to commit an equal amount of resources to improving the local schools. To be sure, many businesses may get involved out of a sense of community responsibility and they can certainly do some good, but as long as business involvement is based on a voluntaristic ethos of community participation, business-school partnerships will remain a sideshow in educational reform.

The overall objective should therefore be to develop the link between schools and the workplace without relying primarily on voluntary business participation. This can be done in three ways. First, schools can be organized and designed internally to strengthen their relationship to the workplace. This can involve

reform of curriculum and pedagogy as well as development of units or positions within schools with the responsibility of understanding the local labor market, maintaining communication with local employers, and helping to match students to employers. Second, employers could be given incentives to participate perhaps through subsidies for coop or apprenticeship placements. Third, employers might be required to participate perhaps, as in Germany, through mandatory membership in local employer organizations.

These three broad approaches to strengthening the link between school and work can help define the research agenda. In light of our political system, the first--reform of the design and organization of schools to strengthen their relationship to the workplace--is the most likely to be developed. On the other hand, if the profusion of current interest in youth apprenticeship continues, the issue of employer participation will need to be addressed more directly. Particularly in that case, more attention will have to be paid to securing direct employer participation based either on incentives--the second broad approach--or regulation--the third approach.

If employer involvement is to become a central focus of educational reform, I would emphasize efforts to redefine business involvement in the schools, as is suggested in the OERI document. This in turn implies that we not assign a high priority to research on the existence, characteristics, or effects of school/business "partnerships" of the traditional

type. Indeed, this has already received more than enough attention. If anything, a small research program to describe and diffuse long lasting partnership models might be helpful to businesses or schools that are interested in setting up such partnerships.

Rather, I would focus research in three broad areas:

1) The first concerns innovative pedagogy that relates in a fundamental way, the school experience to the outside environment, including the workplace. Current efforts include cognitive apprenticeship, school based enterprise, contextual or situated learning, integrating academic and vocational education, and other strategies that in effect simulate the outside world within the school. These approaches appear to have the potential to improve student work preparation without displacing traditional academic material. This, however, involves fundamental reform of education and pedagogy and therefore does not fall exclusively under the "objective" being discussed here.

2) The second area of research involves building a base of knowledge to help schools develop better interactive communication with businesses. Traditional "partnerships" may be helpful here, but there are other ways to communicate with non-school institutions. For example, these might involve counselors or other personnel in the schools (building on the college counselor model). The type of information about the school and the students that is made available to the employer is relevant here. A general research strategy might be to study schools that

are perceived as having good communication with the community and local employers. Some pilot projects could also be set up and monitored.

3) The third research area involves studying incentives for employer participation with the objective of working towards a legal and institutional framework for securing stable employer involvement with education. This line of research will be particularly important if we move forward with plans to broaden the use of apprenticeship. A broad apprenticeship program will be extremely difficult based only on public-service-oriented employer participation. There are many possible avenues of research here, including analysis of employer participation in educational programs abroad and employer participation in coop ed or similar strategies in the US.

Objective Two: "All workers will have the opportunity to acquire the knowledge and skills, from basic to highly technical, needed to adapt to emerging new technologies, work methods, and markets through public and private educational, vocational, technical, workplace or other programs."

The discussions about the necessary skills for the "emerging" workplace have evolved significantly over the last several years. Previously focussed on the skill implications of new technology, in the last decade, the discussion has placed much greater emphasis on innovative forms of work organization.

In effect, researchers have argued that most technology, including computers, can be used in a variety of ways so that its effects on required skills are ambiguous. Which skills are necessary therefore depends not so much on the technology as on the organization of the production process in which that technology was used.

In turn, the organizational issue has come to be conceptualized according to two basic models of production. These two models go by a variety of names, but they are often called the "mass production," model based on deskilling through the extensive division of labor and "high performance" model based on higher skills, decentralization of responsibility, and greater employee involvement. High performance workplaces require advanced technical skills--many workers will be working with computers and advanced micro-electronic equipment--but research has put at least as much emphasis on what could be called advanced generic skills such as problem solving, the ability to understand a set of tasks within their broader context, social and group (or teamwork) skills, and general adaptability. One reason that many analysts argue that high performance systems are increasingly important is that they are thought to be more able to adapt to an economic environment in which change is accelerating. Advanced generic skills are thought to be particularly important for effective work in an uncertain and rapidly changing environment.

According to this framework the demand for greater skills,

especially advanced generic skills, among so-called "front line" workers depends on the extent to which firms have moved to the high performance model. There is probably more consensus concerning this conclusion than there is about the extent to which the high performance model has in fact been adopted. Indeed many analysts argue that despite several well-known examples of apparently successful organizational innovation, in general, US firms have been slow to adopt the high performance approach. Furthermore, if firms fail to move to more innovative organizational forms, slow productivity growth and stagnant real wages will continue. Thus promoting innovative work organization is a crucial national issue that can have an important effect on the nation's standard of living.

But ironically, both those who are pessimistic and those who are optimistic concerning the spread of the high performance model arrive at much the same conclusions concerning the educational policy implications. Both argue that the education system must do a much better job at teaching all students traditional as well as advanced generic skills. If firms are moving towards high performance systems, then there will be a demand for graduates with those skills. If firms are clinging to traditional approaches, encouraging them to shift to transformed strategies will be that much harder if workers with appropriate skills are not available. Indeed, some argue that by creating a supply of skilled workers, employers will be encouraged (or perhaps forced) to reform by a well-educated and skilled

workforce dissatisfied with traditionally organized work.

But while prescriptions for the schools may not be significantly affected by the speed of organizational transformation, the current conditions within workplaces will have a significant effect on the role that the firm itself can play as an educator. Mass-production-oriented firms that emphasize work simplification are not likely to be good sites for learning. This is true whether we are considering the retraining of adult workers or the widespread involvement of workplaces in youth apprenticeship programs.

This general framework suggests an extensive research agenda including the following components:

1) Further exploration of the conditions under which different forms of work organization are most effective. In other words, despite a widespread belief that "high performance" organizations are desirable, we should continue to question that conclusion. Furthermore, we expect that products and technologies will change constantly, it would be logical to expect that the characteristics of effective organizations would also continue to change. The study of the effectiveness of innovative work organization is itself an immense field. Sub areas of research might include further conceptualization and definition of innovative organizational forms and techniques, better definitions and measurements of firm performance, and improved methods for collecting longitudinal data on firm performance and characteristics. This is extremely important

research, but probably not something that OERI would fund alone.

2) Further study of the extent to which innovative organizational forms have spread. This would also require better conceptualizations of organizational forms and better data and information on organizations. This research program would fit well with the issues discussed above (the effectiveness of organizational innovations), on the other hand, on a more restricted basis, this type of project might be something that OERI could fund. Given the importance of this issue to the role that firms might be able to play as educators and trainers, this would also fit well with the overall mission of the Department of Education.

3) Analysis and identification of skills used on the job, especially in modern organizations. The basic hypothesis that emerges from the research framework elaborated above is that workers increasingly need advanced generic skills. Thus research must evaluate further that hypothesis and search for other needed skills that may not have received as much attention. This task is an important but very difficult undertaking. Surveys of employers are probably not that illuminating. Well designed surveys of employees may be more useful, but the best approach is probably to combine surveys of employees with field work at the workplace. This is very costly, but essential and provides a clear role for OERI.

4) Another area that is closely related to the preceding agenda recommendation involves research on the nature of learning

on the job. To the extent that we expect workers, either adults or adolescents in youth apprenticeship programs, to learn on the job, we need a better understanding of on-the-job pedagogy. Knowledge about this is probably more advanced in some other countries (in Germany on the job training is regulated) there is almost no research on the subject in the US. This will also help us understand the circumstances under which learning can take place on the job and when learning would be most effective in the classroom or other non-work settings.

5) As we develop a more concrete understanding of work and the types of skills that it demands, researchers must also try to assess whether schools and classrooms are designed to teach those skills. The strategies I discussed earlier as ways to connect schools more closely to the workplace and community may also be the best approaches for preparing students for the workplace of the future, not because they have developed a curriculum to teach advanced generic skills, but rather that the pedagogical method creates an experience through students develop those skills by trying to use them. We do know much more about learning in the classroom than about learning on the job, but a research program designed to help guarantee that students are prepared for the 21st century, must at some point return to in-school pedagogy.

Thus the five research areas that I have outline can be summarized as follows: 1) what are the best forms of production organization, 2) are firms adopting them and if not why not? 3) what skills do they require? 4) under what circumstances can the

required skills be learned on the job? and 5) how are skills best taught--in schools or non-work settings? For the most part, the points listed under "needed research" on pages 32 and 33 of the OERI document can all fit within this framework.

OERI Advisory Committee: Goal Five
Minority Success in a Global Economy
by
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Introduction

Goal Five of the National Education Goals presents an enormously ambitious, but necessary, challenge for postsecondary educational institutions, including both the academic and workforce preparation systems. The goal is as follows:

> By the year 2000, every American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.

Much of the challenge is ensuring that American ethnic minority groups who are underrepresented in postsecondary institutions have the learning and training opportunities needed to acquire the skills required for work in the high-skill, high-performance careers and jobs that are projected for the 21st century. Since minorities, especially African American and Latinos, experience higher rates of poverty, single parenting, teen pregnancy and crime, are at higher risk of dropping out of school and attend lower quality schools, the strategies and resources needed to prepare them for 21st century literacy and employment skills will be extraordinary. New incentives may be needed just to motivate members of these minority groups to participate in higher levels of education, because historically, even when they have achieved educational success by completing diplomas, certificates and degrees, they have not reaped the employment status and social mobility equivalent to their white counterparts. Recent government studies also show that very few are afforded continuing education and training at employer expense.

Persistent problems that often have been documented in national and state-level reports on education and economic success of minorities include the following: (1) lack of data and information about the resources and effort at various levels, (2) lack of coordination among agencies, (3) lack of evaluation of the various initiatives that have been aimed at addressing these problems, and (4) lack of reliable data and information about the knowledge and skill attainment and needs of traditional-aged postsecondary students, as well as adult minority students. Recent national, state, local and private efforts to increase the literacy and employment skills of minorities should be evaluated to monitor program effectiveness and coordination, to track student progress, changes in literacy rates and overall educational achievement.

This paper focuses primarily on objective five of Goal Five which challenges the nation to increase substantially the proportion of qualified *minority* students (specifically, African American, Latinos and American Indians) who enter college, persist for at least two years and complete their degree programs (emphasis added). Because the responsibility and accountability for achieving national education goals will fall primarily to the states, new and developing state mechanisms for monitoring and assessing minority achievement and progress constitute part of the focus. The current status of minorities in today's workforce, including how many are in the workforce, the types of jobs they hold and the level of wages they earn are also examined. Finally, suggestions are presented about what types of additional research is needed in order to develop effective strategies to increase minority literacy, and minority participation and success in postsecondary education, leading ultimately to participation in the world-class American workforce of the present and future.

I. ***Monitor U.S. population demographics and related levels of minority student school- and college-going rates***

The size of the minority population in the United States, the minority growth rate and the geographic areas where this growth is prominent are important beginning benchmarks for assessing the educational needs in order to achieve Goal Five. The U.S. population census includes data on the size and geographic distribution of prospective minority college students and employees, as well as the demographics (age, ethnic, sex and socioeconomic status distribution) of the population. Such data are important for gaining awareness and understanding changes in the magnitude of the educational challenge and are essential for setting goals for increasing the participation and success of minority populations in a dynamic world economy.

Recent U.S. census data reveal that the nation is experiencing unprecedented change in the characteristics of its population. Since the 1980 census, minorities have represented a steadily growing proportion of the population. The large growth reflected in the 1990 census was due primarily to the relative growth of minority birth and immigration rates between 1980 and 1990, particularly among Latinos and Asians. Between 1980 and 1990, the total population of the United States increased by 9.8%, while the African American and Latino populations increased at a higher rate -- 11.9% and 53%, respectively. During the same time the population growth of U.S. citizens called "all other" was more than six times the overall population growth rate, at 61.6 percent. This reflects the dramatic increase in the Asian population of the United States, particularly Southeast Asian immigrants. Minorities were 23.2% of the population in 1980, increasing to 24.9% in 1990. African Americans. Latinos and American Indians make up 12.1%,

9%, .8%, respectively. The Asian American population represents 2.9% of the American population.[1]

Further analyses of population trends reveal that while minorities represented around 24.9% of the United States population in 1990, minority youth made up more than 30% of pupils enrolled in kindergarten through 12th grade, up from 24% in 1980.[2] This representation of minority students -- nearly one-third more than their representation in the general population -- suggests not only that future generations of the U.S. population will include more minorities, but also that changing demographics will have a greater immediate impact upon the nation's educational institutions than any other sector of American society. It also suggests that the success of the nation's schools in educating minority youth will determine the quality of American life, particularly the make-up of its work force and colleges and universities, in the decades to come. Assuming that America's colleges and universities remain at the same capacity or greater, today's minority elementary school students will compose a much larger share of the work force and higher education institutions than minorities do today.

The percent that each minority group represents of the elementary and secondary school population increased from 1976 to 1986, while the number and proportion of white students declined. White enrollment in elementary and secondary schools declined from 76% in 1976 to 70.4% in 1986. The representation of African American students increased from 15.5% to 16.1%; Latino representation in the schools grew from 6.4% to 9.9%; and Asian representation more than doubled from 1.2% in 1976 to 2.8% in 1986. American Indian representation remained constant at nine-tenths of 1 percent.[3]

Demographic shifts in the population are also likely to affect the nation's colleges and

universities in similar ways. The college-going rates and ethnic composition of colleges and universities should increase in states with particularly high minority populations. For example, African Americans make up the largest minority group in both the school-age and general populations of the South (in 1989 African American school enrollment in Mississippi was over 50 percent). Latino enrollment in California and Texas is 33 percent. Almost 72% of K-12 enrollment in Hawaii is made up of Asian Americans (including Pacific Islanders) and they are a growing share of the population and school enrollments in California.[4] Such state and regional data are important to plan strategies to increase minority entry into postsecondary institutions and to plan the operational changes colleges and universities need to make in order to accommodate the growing diversity of students. For example, using these demographic data, the California Postsecondary Education Commission predicts that Latino high school graduates will increase from representing 23% of their class in 1990 to 36% in the year 2000. Using these data, the commission has forewarned the colleges and universities in California that this change in the composition of the student body will mean corresponding changes in how courses are taught and the types and levels of support services needed.[5]

State higher education systems also use population census data to help gauge success in meeting goals of increasing the participation of minorities in postsecondary programs.[6] For example, Washington's *Policy on Minority Participation and Diversity*, a plan adopted by the state's higher education coordinating board includes goals for 1995 undergraduate participation rates in higher education for all ethnic/racial minority groups that equal or exceed the average statewide participation rate for the 17- to 22-year-old population from 1990 to 1995. For 2010, the state higher education board hopes to achieve employment rates for all ethnic/racial minority

groups in faculty, executive, administrative and managerial positions that equal or exceed their availability and reflect their proportional representation in the population. The data permits the commission to signal to the states' colleges and universities that in order to achieve these goals, they will have to develop strategies to increase minority admission and success in college.

While demographic changes and conditions of the population are important, those factors alone will not be the sole basis upon which schools will succeed at graduating minority students nor the singular basis for colleges and universities to set goals and make progress in increasing student entry and achievement. They are also not useful in projecting minority student retention and performance in postsecondary programs. Existing gaps between minority representation in the elementary/secondary schools and their representation in higher education are unlikely to dissipate simply by virtue of the growing representation in the school-age populations. In fact, because a higher proportion of minority youth are born in areas of poverty (where schools are also the weakest) and because the greatest contribution to the U.S. minority population is the growing rate of relatively undereducated immigrants, gaps are more likely to expand rather than contract unless extraordinary and effective interventions are undertaken in the elementary and secondary schools that minority students attend.[7]

II. ***Measure levels of skills and academic achievement***

Student skill levels: National and state-level reports on the academic skills of all American students cite the poor performance of students' abilities to read, write, compute, solve problems and work as part of a team, and especially poor performance for minority students. For example, recent reading, science and mathematics proficiency scores of white, African American and Latino 9-, 13-, and 17-year-olds on the National Assessment of Educational Progress (NAEP)

show that none of the groups achieved skill levels that could support high-performance in modern workplaces. At each age-level and in all three curriculum areas, African American and Latino youth significantly trail their white counterparts.[8]

Another NAEP report reflecting adult (ages 21 to 25) literacy present equally disturbing results.[9] This report reveals that a smaller number of young adults are performing at increasing levels of proficiency on any of the literacy scales (prose, document or quantitative). This is especially true for young adults who terminate their education early and for minorities. Of the group studied, African American young adults performed significantly below their white peers. Latinos performed about midway between their African American and white peers.[10]

Course-taking patterns: Rigorous academic programs in schools prepare students for success in college and the work place. If minorities are going to be expected to be able to compete for the high-skill, high-wage jobs in changing American industries and businesses, they will need to be better prepared than they are today and equal to their white counterparts. African American and Latino secondary school students take fewer mathematics and science courses (especially advanced courses) than their white counterparts, are less likely to be in an academic track in school and also less seldom take challenging vocational courses in high school that lead to high-skilled jobs and that prepare them to continue their studies in college.[11]

According to surveys conducted by the American College Testing (ACT) Program, only 42% of African Americans and 43% of Mexican Americans, compared to 48% of white college bound seniors, take academic curricula in high school. Asians taking the ACT represented the only ethnic group in which more than 50% of the students were taking core or more advanced courses.

Students in the most disadvantaged schools (schools with the high proportions of poor and academically disadvantaged students) take more vocational education course work and it is of significantly lower quality than students in advantaged schools.[12] Students in the most disadvantaged schools take 12.06 credits in academic subjects and 6.49 credits in vocational education (less than twice as many academic as vocational credit), compared to 16.26 credits in academic subjects and 3.26 credits in vocational subjects in the most advantaged schools. Even among the students taking vocational high school curricula, minority students (particularly African American) are underrepresented in the programs with higher skill training leading to higher income occupations and postsecondary education (agriculture, medical emergency technicians, steno/secretarial, electronics, welding, automobile specialization and machine shop) and overrepresented in programs leading to jobs with lower income and fewer advancement possibilities (medical lab assistant, clerk typist, appliance repair, masonry, custodial services, quantity foods, textile production and upholstering).[13] Minorities are also more often enrolled in programs that do not include mathematics and science courses.[14] This lack of program quality is also documented for postsecondary vocational education programs in a number of national and state studies. For example, the National Assessment of Vocational Education (NAVE) also reports that students in proprietary schools and vocational institutes take about 70% of their coursework in vocational fields.[15] The National Center on Educational Statistics (NCES) report that overall, only two-fifths of all credits earned by vocational associate of arts (A.A.) degree recipients are in academic subjects.[16]

Recent amendments to the 1990 Carl D. Perkins Vocational and Applied Technology Education Act support strengthening vocational programs through greater concentration on

academics and basic skills development. States will have resources to develop new curricula, such as applied academics which integrate academic content with practical application, and new structures, such as "tech prep" programs that bridge secondary and postsecondary systems. These changes may have important and significant impacts on minority student achievement levels, especially for the half of high school students who previously would not have pursued education and training after graduation. But, research and evaluation will be needed in order to assess the distribution and impact of these resources, as well as to assess the affect this policy has on minority students.

Between 1980 and 1990, almost 40 states have changed their course requirements for high school graduation; most of the changes were increases in mathematics and science.[17] Some of these changes were driven by increased requirements for admissions enacted by public colleges and universities. These recent state policies should continue to be monitored and the results analyzed to determine improvements in participation and achievement in postsecondary programs, particularly among minorities. This should also be done for school restructuring strategies that change teaching and learning dynamics. For example, the National Science Foundation has provided demonstration grants to 21 states to develop strategies to improve the teaching and learning of mathematics and science. A principal component of the Statewide Systemic Initiatives (SSI) in many states is to improve math and science achievement of students in urban areas where a majority of minority students live and attend school.

Many state higher education boards are developing high school feedback reports that aim to provide schools and districts with information about the higher education performance of their recent graduates. In a survey conducted by the State Higher Education Executive Officers

Association (SHEEO) in September 1992, 23 of 50 state boards indicated they were involved in developing these reports. For example, the report developed by the Illinois Board of Higher Education provides each of the state's high schools individual and comparative information on class percentile rank, ACT score or its equivalent, and first term grades for all freshmen at each university. The report also contains nine tables summarizing data for three instructional level in English, mathematics and natural sciences: basic (courses offering no credit toward graduation), freshman courses (the first course appropriate for a student who has met minimum course requirements for college admission), and advanced placement courses (courses beyond the freshman level).[18]

Few, if any of these states, however, have tracked the uses of these reports. They may provide important information in helping schools (especially those with high minority student concentrations) assess the quality of their academic and other preparation programs or identify problems in school-to-college transition that could be used to launch strategies for improvement.

New performance-based assessments that will measure specific outcomes--what students know and can do--are currently being driven by the National Education Goals and may have an impact upon student skills attainment and academic achievement. Specifically, Goal 5 is influencing a number of efforts including an employment skills framework developed by the Secretary of Labor's Commission on Achieving Necessary Skills (SCANS). Examination and analyses are needed in order to show the extent to which these assessments (including competency-based exams and portfolios) will predict collegiate and employment success--currently, a major deterrent in their acceptability by college admissions officers and employers.

III. ***Monitor postsecondary access, retention and success***

College admission is a critical point in the assessment process because college and university decisions about which students to accept, and student decisions about whether and where to attend college have an enormous impact upon subsequent experiences and outcomes. Students' level of effort and involvement and such outcomes as grades earned, the quality of social and academic experiences, the rate of progress toward completing the curriculum and the educational and career success beyond college all hinge upon whether the institution is a "good fit" for the student or whether the institution is prepared to accommodate a range of student needs. The overwhelming evidence is that many college students from underrepresented minority groups are underprepared, have relatively poor academic performance and educational experiences in college, drop out at higher rates and progress slower toward a baccalaureate degree, if they persist at all.

Enrollment: In 1988, approximately 61% of white students, 45% of African Americans and 57% of Latino high school graduates enrolled in postsecondary education within a year of receiving their high school diplomas.[19] These included both part-time and full-time students who attended two-year and four-year institutions, as well as other postsecondary technical schools. Among those who entered college upon completing high school, Latino students attend full-time (85%) at a slightly lower rate than African Americans (90%) and whites (89%). In 1988, 44% of Latinos, 58% of African Americans, 60% of Asian Americans were enrolled in four-year institutions compared to 64% of white college students. Enrollment in historically black colleges and universities (HBCU) increased by nearly 10% between 1987 and 1989. While African Americans made up 84% of the student population in these institutions, their enrollment

rate increased by only 9.9% compared to 16.1% for whites, 32.1% for Asians and 18.9% for Latinos. One in every six African Americans enrolled in higher education attended an HBCU.

State and institutional policies influenced by recent budget crises in many states may significantly alter enrollment in postsecondary programs. Drastically reduced funding has forced public institutions to look for cost-saving measures such as enrollment caps. For example, the California State University System predicts that this year they may have to cut enrollment by 20,000 students because of continued projected reductions in state appropriations. With more students completing high school and making plans to continue their education in postsecondary programs, the result will be greater numbers of students entering community colleges and postsecondary technical institutes, or being denied access altogether. The extent that this specifically impacts minority students will have to be closely monitored and evaluated.

College Admissions Test Scores: Even with steady progress during the past decade, the average college admissions test scores of non-Asian minority college-bound seniors remained substantially below those of their white counterparts. For example, African American college-bound seniors in 1992 scored an average of 90 points below whites on the verbal section of the SAT (352 compared to 442) and 106 points below on the quantitative section (385 compared to 491). Among Latinos in 1992, the average Mexican American college-bound senior scored an average of 70 points below whites on the verbal and 66 points below on the quantitative.[20] The ACT composite scores of whites in 1992 at 21.3 remained substantially above the scores of non-Asian minorities. African Americans, Mexican Americans and American Indian obtained composite scores of 17.0, 18.4 and 18.1, respectively.

Developmental/Remedial Programs: There is significant evidence of colleges and

universities adjusting their admissions policies in order to admit more minority students. Some recently enacted state assessment and placement policies have produced a sorting mechanism that is higher education's version of curriculum tracking. Policies enacted in Texas, New Jersey, Florida, Arkansas, Georgia, Tennessee and other states require students entering public colleges and universities with admissions or placement test scores below a specific level to take remedial/developmental non-credit courses. As a result of these and similar policies, nearly 25% of all freshmen and 42% of non-Asian minorities are placed into developmental curricula upon entering college. A 1988 study of southern states conducted by the Southern Regional Education Board (SREB) found that 36% of entering freshmen need additional academic support in reading, writing or mathematics. Twenty-seven percent of students in research universities, 37% in two-year institutions and 38% in liberal arts/comprehensive institutions were in remedial/developmental programs.[21] At least 80% of U.S. colleges and universities are known to offer developmental/remedial instruction. The majority of students enrolled in such courses are from underrepresented minority groups.[22] Institutions should begin to track retention, rates of progress and other outcomes of students who enter through the remedial track compared with those entering the normal mainstream college curricula.

Some states, such as Colorado and Illinois, have developed student tracking systems that show the transfer and baccalaureate degree completion rates of those who initially enter two-year colleges, compared to their counterparts who start college at four-year institutions. Analyses of these data have led to state policies targeting student needs. For example, the Illinois Board's study of persistence behavior of students who transferred from community colleges to public universities in fiscal years 1987 through 1989 shows that only 19% of the African American

transfer students completed baccalaureate degrees within four years after transferring. Of the Latino transfers in fiscal year 1987, 35% completed a baccalaureate degree through fiscal year 1990.[23] The board concluded that the higher attrition rates of minorities reflected in their analysis underscored the importance of board policies calling for closer school-college collaboration to help prepare students for baccalaureate-level degree programs, remediation for those who are underprepared, and support services, assessment of student achievement and monitoring of student progress.

Financing Postsecondary Education: The economic condition of minorities is also an important demographic factor for schools, postsecondary institutions, employers and public policy makers who are considering planning and goal setting to increase minority student participation and achievement. In 1989, over 43% of African Americans and approximately 36% of Latinos below the age of 18 lived in poverty, compared to 14% of their white peers.[24] Aside from the fact that socioeconomic status, academic achievement and quality of schooling are all interrelated, the socioeconomic status of minority youngsters is believed to make attending college financially prohibitive and to discourage them from investing the effort to prepare academically for college. The percent of poor high school graduates enrolling in college decreased from 34% in 1975 to 30% in 1986. At the same time, however, non-poor student enrollment increased from 34% to 39%.[25] Of fall 1986 undergraduates, 10% of white students came from families with annual incomes of less than $11,000, compared to 21% of Asian Americans, 31% of African Americans, 25% of Latinos and 24% of American Indians.[26]

Minority students make up a much higher proportion of need-based federal aid recipients than they represent of the general college student population. For example, minorities comprise

under 20% of the college student enrollments in U.S. colleges and universities, but receive approximately 30% of Pell Grants.[27]

Judging the effectiveness of financial interventions to enhance the size and quality of the minority student pool is important. For example, financial incentives offered to student at an early age are believed to help motivate and encourage minority students to improve their precollege academic preparation. Such incentives also are being advanced as a means of enhancing opportunities for minorities to attend college when it appears that higher education is too expensive. At the state level, New York State's Liberty Scholarships, Rhode Island's Children's Crusade for Higher Education and Louisiana's Tuition Assistance Plan are examples of statewide intervention programs designed to increase the high school graduation and college-going rates of economically disadvantaged students. But, state budget reductions have had a devastating impact on the viability of these programs. Without sufficient funds and prolonged duration, there is no way to test whether and to what extent these programs work in achieving these objectives.

Student Experiences and Institutional Practices: Student attitudes, behaviors and experiences and institutional programs, practices and policies constitute what often has been called institutional climate. Like student background characteristics, institutional climate contributes to both student and institutional outcomes. It accounts for much of the persistence, progress and academic achievement of college students.

Little information exists addressing the problems and issues of any minority group's experiences in the nation's colleges and universities. As with personal and academic background characteristics, minority students of various ethnic groups differ from one another with respect

to their experiences and performance in college. But the experiences of non-Asian minorities tend to be inferior to those of majority students attending the same institutions. The campus climate for minorities tend to be more alienating than involving. On more and more campuses, racism and racial hostility are prominent.[28]

Some state higher education boards are including efforts to address campus climate in their policies to increase diversity at postsecondary institutions. For example, South Carolina's *Higher Education Program for Access and Equity* requires each public institution to develop strategic plans that include attention to enhancing minority students' experiences on campus. Pennsylvania's *Task Force on Intergroup Relations in Higher Education* will investigate behavior that reflects intergroup tension, such as ethnic jokes, name-calling, graffiti that reflect group hatred and distribution of hate literature. It also will address remedies for these issues within constitutional allowances, such as models of dialogue, negotiation, mediation and conciliation among students, faculty and administration. After they have been operating for a sufficient amount of time, a review and analyses of these initiatives may provide important new information on ways that institutions of higher education might support positive campus experiences for minority students.

Additional behavioral differences between majority and minority students should be measured when assessing the educational experience and process. Such factors as differing rates of stopping out and returning to college, transfer rates from both four-year and two-year institutions to other four-year institutions, and patterns of selection and distribution of minority students among the various major fields have consistently been found to be related to the relative quality of experiences students have in college, to the quality of their college environment and

to institutional and student outcomes.

Student and Institutional Outcomes: The performance of minority students tends to lag behind that of their majority counterparts even when they have studied the same college curriculum. On average, non-Asian minorities tend to have lower college grade point averages, progress slower through the curriculum, score lower on tests, are less likely to attend graduate school, score lower on graduate admissions tests, are offered fewer research assistantships for graduate school and have fewer opportunities in the labor market upon completing college.[29]

Similarly, colleges and universities report smaller numbers of minorities in their graduating classes than in their entering classes of freshmen and appear to be unsuccessful in eliminating performance gaps between minority and majority students. Nationally, African Americans and Latinos represented 5.7% and 2.9% respectively, of the baccalaureate degree recipients in 1989.[30] Both the number and the percent of African American bachelors', masters' and doctoral degree recipients declined nationally during the past decade, while all others, except white masters' and doctoral-degree recipients, increased. Between 1979 and 1989, the number of African Americans receiving baccalaureate degrees declined 3.5 percent. For masters' degrees, the decline was 30%, and for doctoral degrees 16 percent.[31] While comparable data for Latinos reveal some progress, there has been a substantial lag between their share of advanced degrees and their increasing share of the U.S. population.

If the intent of Goal Five is to be realized, state higher education boards, colleges and universities will have to increase their efforts in identifying the extent of underrepresentation in such fields as mathematics and science, and the obstacles to greater minority participation. They need to develop new strategies in order to achieve more favorable outcomes. Assessment of

student qualifications, aspirations, attitudes and behaviors; institutional and departmental admissions policies, racial composition of the faculty and administration; and institutional affirmative action initiatives should all be examined as part of the strategic planning aimed at increasing minority representation and achievement.

IV. ***Assess transition to the workplace***

School-to-Work Transitions: About half of the students who leave or complete high school do not continue to an undergraduate education.[32] Yet, there has been little study of the career and educational patterns followed by youth who do not continue their formal education by attending postsecondary education programs after completing high school. Most research on educational attainment has focused on college-bound populations and typically has emphasized "on-time" entrance to college and "on-time" completion. Relatively little is known about delayed entrance to postsecondary schooling, or about the switching or combining of work and school roles. Policy makers are left with only the most general notions of what constitutes a successful transition to stable employment for those who do not go to college.[33]

A recent study using data from the High School and Beyond Study (HS&B) begins to show patterns of schooling and employment of young people who did not enter college immediately after high school.[34] The findings suggest high instability among high school graduates who do not enter college. Although many acquired some postsecondary education during the six-year period after high school, the consequences of that education tended to be less rewarding than those who went directly to college. For example, the study reached some of the following conclusions: (1) The longer students are without a transition point (either work or continued education), the more likely they will remain in that status. (2) The unemployment rate

for these high school graduates was high. Twenty percent were neither employed nor in school six years after high school graduation. This condition was more common among African Americans (26.1%) and Latinos (21.5%) than for whites (19.2%). (3) High school curriculum, placement and coursework (e.g., whether non-college bound youth were in academic or vocational tracks) seemed to have little bearing on whether youth attended school or persisted in efforts to continue their schooling. Although this suggests that access to continued education and training is available regardless of the quality of the high school program, the implications of this are troubling in light of what is known about background and behavioral characteristics related to success in baccalaureate and quality postsecondary vocational education programs. The authors suggest further research is needed to examine the quality of postsecondary education and training for non-college bound youth.

Apprenticeship and cooperative education programs: Increasing attention is being paid by policymakers to new forms of education-to-work structures that provide options to students who chose not to pursue a degree program directly after high school. Proposed apprenticeship and cooperative education programs combine rigorous academic instruction with employment-based training for students, provide early exposure to work experiences, ensure opportunities for further postsecondary education and encourage lifelong skill-building. For example, at the national level, the Council of Chief State School Officers and the Pew Charitable Trusts last year created a state-level competitive grant program called "New Career Paths Through Youth Apprenticeship." The purpose of the grants is to support exemplary efforts to develop systems of youth apprenticeships. In the first round of competition, 10 state education agencies were awarded grants to design and develop apprenticeship systems.[35] In the second round, five states

(California, Maine, Minnesota, West Virginia and Wisconsin) were awarded funds to extend their efforts to build or improve youth apprenticeship systems.[36] Comparable efforts are being considered at the federal level. For example, the proposed National Youth Apprenticeship Act of 1992 would allow youth apprentices to complete a high school diploma, earn a certificate of competency and qualify for a postsecondary program, a registered apprenticeship or employment.[37] If they are funded and built into systemic workforce education and training efforts, there should be assurances that they recognize and accommodate diverse student populations. The systems should provide mechanisms for evaluating how apprenticeship strategies effect students' career and educational achievements, and these data should be disaggregated by race/ethnicity and gender. Also, information is needed on how students are placed into programs, who is selected for which programs, and, upon completion, who and how many students are offered full-time employment opportunities.

Quality employment opportunities: In 1989, the U.S. had over 117 million employed workers. Over 10% of this working population were African American and approximately 7% were Latino. Few of these minority workers were in fields requiring postsecondary degrees. African Americans and Latinos represented only 6% and 3.7%, respectively, of managerial and professional jobs in this country. For example, African Americans represent 2% of architects, 3% of physicians, under 4% of engineers, and 3% of lawyers. (Latino representation in these fields is 5.8%, 5.4%, 2.3% and 3.4%.)

Minorities are equally absent from technical specialties (those requiring high levels of skills and paying high wages). Of the more that 4 million American workers holding these jobs, 9.5% were African American and slightly over 4% were Latino. However, minorities are over-

represented in low-skill, low-wage jobs. Twenty-four percent of African Americans and almost 15% of Latinos hold jobs as housekeepers, child-care providers and gardeners for private households. Seventeen percent of African Americans and 19% of Latinos provide maintenance and other services for business dwellings.[38]

Because of the kinds of jobs minorities hold, they earn significantly less than white workers. In March 1991, census data show that annual median earnings for white full-time, year-round workers, 18 years-old and over was almost $4,000 more than comparable earnings for African Americans and over $5,000 more than earnings for Latinos. The gaps narrow only slightly as educational achievement increases. For those with four or more years of college, whites earn over $3,000 more annually than African Americans and almost $4,000 more than Latinos. The gap between the white, African American and Latino male wages is especially significant. Median annual earnings for white males (year-round, full-time, 18 years-old and older) was almost $29,000, for African American males it was $21,000 and for Latino men it was $19,000.[39]

The U.S. Census Bureau recently completed a study comparing educational achievement and per capita income of Asian Americans with their white counterparts. The study showed that Asian Americans who were 25 years old and older completed high school at higher levels than their white peers (82% completion compared to 80% for whites). Asian Americans were more successful at completing four years of college than whites (39% compared to 22%). Sixteen percent of Asian Americans have had at least one year of graduate study compared to 9% for whites. Yet, the study reveals that these high levels of achievement have not translated into overall economic advantage. For example, Asian high school graduates earned 79% of what their

white counterparts earned ($21,050 compared to $26,530). The median annual salary of Asian male college graduates was about 90% of the median salary of white males ($37,550 and $41,660, respectively).[40] Similar analysis using census data has been conducted comparing Latinos and whites and the Census Bureau announced it will soon release a report comparing African Americans and whites. But more is needed. Limited information exist on minority worker success in technical occupations and jobs not requiring advanced degrees. In addition to examining differences in education, training, employment opportunities and wages earned by race and ethnicity, these studies should also evaluate and compare gaps in wages by gender.

Other recent studies on racial and gender pay gaps attribute differences in earnings to increased demands for better-educated, better-trained workers in the labor force and a shift in the economy away from manufacturing and toward service sector jobs which seems to negatively affect minorities more than whites.[41] However, more research is necessary to understand the reasons for these gaps in wages between white and minority workers, especially where levels of education and experience are comparable.

V. ***Track and evaluate minority workers access to continuing education and training***

There are growing numbers of continuing education and adult students entering or re-entering postsecondary education and training programs, many to enhance job skills or to prepare for work. It is increasingly important to assess the educational needs, aspirations and achievement of minority adult populations, as well as traditional college-age minority students. In 1991, 86% of whites, and 82% of African Americans and only 57% of Latinos between the ages of 25 and 29 had completed high school. At the same time for the same age group, 22% of whites, 11% of African Americans and under 10% of Latinos had completed four years or

more of college.[42]

Minority adults who continue their education in postsecondary programs are predominately enrolled in 2-year institutions -- community colleges and technical institutes. For example, in October 1990, compared to 31% of white students, 25 years old and older, who were enrolled in 2-year colleges, 40% of African Americans and 49% of Latinos were enrolled in these institutions.[43] Many of these students have enrolled in 2-year programs to enhance their skills and improve their opportunities for occupational and economic success. A survey conducted by the American Association of Community and Junior Colleges (AACJC) reveals that 50% of 2-year college students stated that their primary reason for enrolling was to acquire job-related skills; 36% enrolled in preparation for transfer to a 4-year college or university; 15% wanted to fulfill a personal interest; and 4% said they wanted to increase basic English, reading or math skills.[44]

Additional research is needed to monitor minority adult students participation and completion in postsecondary programs designed to improve and enhance workforce skills. This information might include the kinds and quality of programs in which minority students participate, whether the programs are related to the skills needed to enhance employment opportunity, whether students obtain jobs in areas of study or training, how these students are financing their education, whether students are attending full- or part-time, the time needed to complete the programs, and the rate of completion.

As expected, the least educated and least skilled workers in this country receive the least amount of employer-sponsored workforce training. And, training is unevenly distributed among the American population. African American who make up approximately 10% of the American

workforce, receive about 5% of formal workforce training. Latinos receive less than 3% of formal employer-based training. However, whites who make up about 85% of the workforce, participate in over 90% of employer-sponsored training.[45]

Conclusion and Recommendations:

The data and information highlighted in this paper reveal much of what is known about minority access and achievement in four principal areas: (1) preparation for college, (2) transition from school-to-college and school-to-work, (3) access, achievement and completion at the postsecondary education level, and (4) success in the workplace. State policies for monitoring the above also reveal that there are many unanswered questions regarding adult literacy and preparation for work needed to support policy development to ensure that minorities progress toward the aims of Goal Five. Among the most crucial questions for which OERI research should be directed are the following:

1) What do the states know about the quality of educational preparation, achievement and employment of minorities?

2) What state policy initiatives are effective in increasing minority student participation and achievement in higher education and work?

3) What are the models of success in the United States with regard to ensuring and promoting minority educational achievement? Do these models support and promote the skills needed in a high-performance work environment of the 21st century?

4) What is the status of minority adult literacy in the United States and how does this compare with the skills of others and the skills required in a high performance workplace?

5) What are the types and quality of workforce preparation and training programs in which

minority men and women are enrolling? What is the level of minority participation and achievement in these programs?

We recommend that OERI develop and plan to work with state K-12 and postsecondary systems to carry out research aimed at addressing these issues.

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